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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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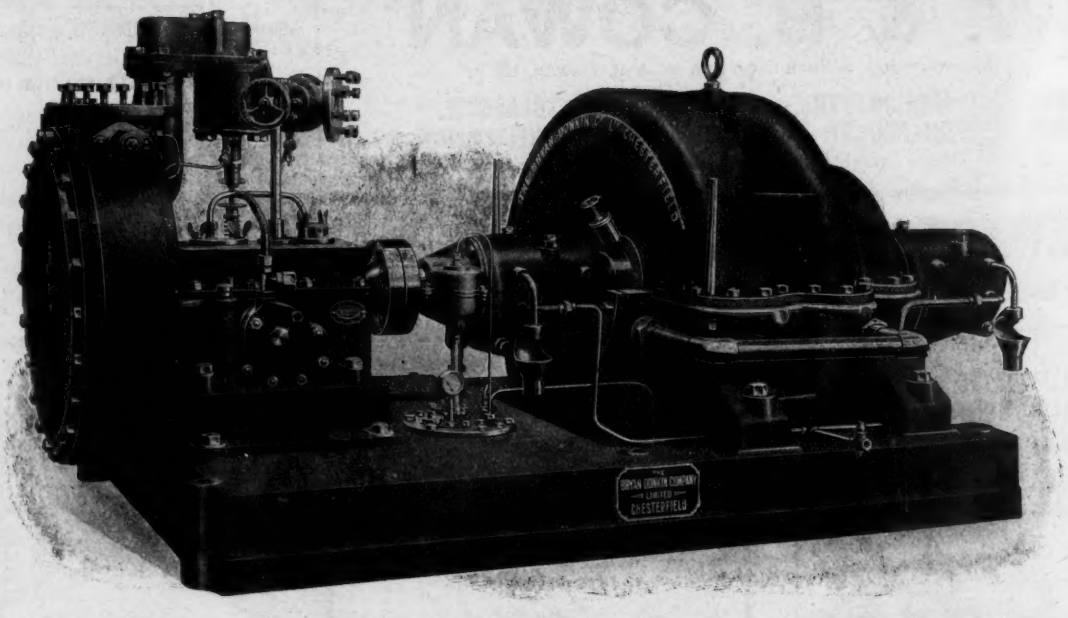

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VOL. CLXX., No. 3235.] WEDNESDAY, MAY 13, 1925. [77TH YEAR.

EDITORIAL NOTES.

The Wembley Reopening.

THE British Empire Exhibition sprang into life again last Saturday; and it seemed almost impossible, as we wandered along the well-known paths and through the same buildings which afforded so much delight and information to millions of people last year, that it had all been dormant during the long dreary winter through which we have passed. There were the huge buildings of variegated architectural design, with their white exteriors looking as clean and new as in their primal state, there were the lawns and gardens exceeding in beauty their appearance last year, the paths (better surfaced) were filled with people, the lakes were alive with boats with their occupants of joy-gleaning folk; the air was filled with music. Some 121,000 visitors passed the turnstiles; and everyone seemed glad that the great exhibition was again open. If the evidence of popularity at the reawakening continues, there will have to be consideration as to whether Wembley has not become a permanent Imperial institution. But that is a matter for the future; sufficient for the present is the Wembley of to-day. Not only in the glorious sunlit grounds but in the buildings the people were found in large numbers investigating what was to be seen; and from what one witnessed of their interest and enthusiasm everywhere, it was clear that it was not only the pageantry of the morning and the ceremony of reopening by the King-Emperor, accompanied by the Queen, that had attracted them, but men and women of all conditions and places in our social system were giving practical effect to the words in the Royal speech: "To seek knowledge, more knowledge, and again more knowledge of the great heritage which has been entrusted to us is the soundest Imperial policy"—it is likewise the soundest individual policy. His Majesty hopes that the achievements of 1924 will be exceeded by those of 1925. We believe they will be; for when the stupendous work is presently done, those who have co-operated in it will "give a complete and vivid picture as before and yet a fresh picture," which "was a task calling for infinite resource and energy." The most belated work is the old quondam Palace of Engineering, now the Palace of Housing and Transport; and in the Palace of Industry there is still a good deal to be accomplished to give the final finish—particularly in the chemical section. But it is now simply a question of the unpacking of huge cases, and the arrangement of contents—everything is ready for their reception. Nevertheless there was more ready for inspection on the opening day than one could devote time to in a single visit. This year there will be more space available for the crowds in the buildings; and there will be more inducements for concentration upon the exhibits. Everything possible has been done to bring to bear upon this year's exhibition the experience gained in this remarkable Empire enterprise last year; and the exhibitors are going to benefit from what was learned in 1924.

It is altogether a lighter and brighter exhibition, and, in making it so, those responsible have given fresh opportunity to the gas industry. In his speech, His Majesty said that he noted with special pleasure that one of the great halls has been devoted to exhibits illustrating those problems of housing and transport which call so urgently for solution. It was a happy inspiration to make housing and house building a central feature of the exhibition, for the foundation of the Empire is the home. In the vast Palace of Housing and Transport on Saturday, the workers in brick and divers other structural materials, the painters, and the decorators were operating with might and main to bring to a finish what will be virtually a whole street of dwelling-houses, of different structural materials, of different design, and different equipment, and through the "B.C.G.A." and otherwise gas will be there, demonstrating the all-gas house, and the valuable contributor that it is to the liberty and leisure of the occupants. The adequacy of space will give more accommodation for inspection than one had of the temporary houses at another recent exhibition. Adjoining is the grand centenary display of the railway companies; and this is remarkably attractive to people. The fine modern locomotives, the saloon carriages, the demonstrations of signalling and control, all testify in themselves, and by comparison with locomotives of an early generation, to scientific and technical progress. In the same building there are the examples of the aeroplanes which are used by the "R.A.F.;" and there are motor-cars. Thus rail, road, and air transport are seen. It is an advantage for one exhibit to be in close touch with another which also draws people to Wembley and invites their interest, as will the railway centenary exhibits, the aeroplanes, motor-cars, and houses in this case. Having long since passed its centenary in public service, the gas industry can heartily congratulate the railway world upon the completion of its hundred years of service. As we pass out of the Palace of Housing and Transport, we notice standing derelict the building in which the domestic uses of electricity were demonstrated last year, and the electrical rendezvous now being devoted to an altogether different purpose.

In the Palace of Industry there is interest in abundance for the public; and centralized in its old buildings, redecorated, is the Gas Exhibit with extended accommodation and preparations nearing completion and perfection for a variety of demonstrations more far-reaching and spacious than the superficies admitted of last year. It would, we are satisfied, have been the height of folly for the industry not to have participated in the display this year. Great as were the opportunities last year, they will be greater this; and of them those in charge of our interests there are taking full advantage through the enlarged diversity of exhibits, an attractive presentment, and a programme in which is embodied the experience and knowledge gained during the six months' display in 1924. We have this year an Overseas Demonstration Hall, a General Exhibits Hall, a Lecture and Demonstration Hall, and Rest Lounge. The universality of gas use is to be seen by the examples of application from Canada, Australia, South Africa, India, and New Zealand; and a Pioneer's Store will serve to illustrate how the products

of coal carbonization contribute to the service of the industrial activities of our kith and kin across the wide seas. Science knows no bounds, nor does the gas industry; and technical and commercial interests are common wherever there is gas supply—the only exception being the ordinances which govern and control the operations of the industries in the various countries. Empire foodstuffs, and how they are cooked, will also engage attention. The idea of making the universality of gas one of the features of the Exhibit is in keeping with the Empire characteristics of the whole Exhibition. But this is only one of several features; and a wide range of domestic and industrial applications of gas will in a day or two be under demonstration. There will also be during the next six months strong emphasis laid upon the part the gas industry is taking in the national problem of smoke abatement; and the utilization of coke, tar, benzole, and its other products will be stressed. This is highly important in these days, when conditions have brought about a reduced demand. Enlarged requirements will come naturally from the revival of industry; but output is constantly on the increase not only from the gas industry, but from other sources. Educational work regarding the uses and merits of the secondary products must be on an intensified scale. Hence the greater attention that is being given to them in this year's display; hence, too, the road tar exhibit that the National Gas Council are making in the Chemical Section. All tar producers should support the Council in this matter, concerning which investigation and the compilation of the benefits realized as the result of practical experience are required. A serious campaign is necessary. The Exhibition this year gives the opportunity for a start in this. The importance of life in the Exhibit as an attraction has been fully realized, and is being materialized. There will be living tableaux, moving machinery, a daylight cinema, and lectures and cookery demonstrations. The spacious additional hall which has been secured, leading direct from the former halls, enables so much more to be done than last year.

As an educational centre for the gas industry, the Exhibit will be all that the 1924 display was, and much more; and every care is being taken to get not only the general public but people of influence in advisory and other capacities to come and see for themselves. The money provided by the gas-supply undertakings and by the manufacturers of plant and gas-using appliances is being well spent. Already excellent advertising has commenced, which will lead to the Palace of Industry, and to one of its central features—the Gas Exhibit. The descriptive article on later pages will supply readers with the details. Of this we are confident—when the finishing touches have been applied to the Exhibit, and the programme is in full swing, there will be general and cordial approval from the whole industry.

Apart from the Exhibit, a descriptive article is included in this issue which shows how extensively gas is being used in the processes of other exhibitors. We count this not an unimportant thing, as successful application by one manufacturer is an example, with the realization of efficiency and an overall economy, which other manufacturers in the same line of business will be induced to follow. Another special and illustrated article which will give gratification is that dealing with the catering arrangements for the multitude who will be visiting the Exhibition. Several well-known caterers are participating in the work this year; and with one accord they have adopted gas as their principal heating agent. We need not dwell upon this, because the act of adoption speaks louder than words, and the testimony is that of experts, to whom efficiency, economy, flexibility, and reliability are all-important.

Well satisfied as we were with the achievements of last year's gas display, we are hoping for more from this and from the attendant work. That result is being sought by those who are doing the main work in organization; and we heartily wish them a magnificent success. The assurance of this will be strengthened by every local effort throughout the industry to advertise the Exhibit, and to arrange for local influential men to visit it. The Exhibit belongs to the gas industry. Therefore, our counsel to gas undertakings is—Make good use of it.

Municipal Prohibition of Gas.

Many municipal authorities are the owners of electricity supply undertakings in competition with gas undertakings carried on, under statutory authority, by private enterprise. A gas undertaking administered by a company is a public service equally with a municipal electricity undertaking, and is usually a larger ratepayer than the latter. A municipal authority have no legal or moral right to interfere with the trading freedom of the gas company, and they have certainly no right to restrict the liberty of ratepayers to exercise their own will as to which concern they shall patronize for light, heat, and power. The Legislature has imposed upon gas undertakings the obligation to supply, under specified conditions, any occupier of premises with gas upon demand. That confers upon individuals a right which municipal authorities must be restrained from over-riding through their ownership of electricity undertakings. The possession of electricity trading powers by local authorities was never intended by Parliament to enable them to impose conditions upon any individual which would abrogate his rights under the General Law. The Newport (Mon.) Corporation thought the contrary. They have now been told, in effect, that they have no right to do anything of the kind—in other words, that they are not entitled to prescribe conditions which confer a preference upon their electricity undertaking, and which will interfere with the statutory authority and obligations of another trading concern in the area of their jurisdiction. The gas industry is the debtor of the Newport (Mon.) Gas Company for having set this matter right, and for having established a precedent in a measure promoted by the Corporation which can, for all time, be used should any other municipal authority seek to do what the Newport Corporation attempted.

What has occurred is an enlargement of something that had its inception in 1921, when the Corporation developed their housing scheme on the Somerton Estate. In the letting agreement which every tenant was obliged to sign, the Corporation inserted this condition: "The tenant hereby agrees as follows. . . . Not to use gas for the purpose of lighting the premises." There the tenants were deprived of exercising their own will of patronizing the form of light they preferred. In the present session of Parliament, the Corporation in their Bill sought power to develop any lands belonging to them, to erect houses, shops, offices, warehouses, and other like buildings, and to sell, lease, exchange, or otherwise dispose of such premises "upon and subject to such terms, conditions, and restrictions as they may think fit." Sub-section 2 of the clause gives power to the Corporation to grant leases of lands; and sub-section 3 provides that "the Corporation, in selling or disposing of such lands, may attach to the same, and may convey the same, subject to any conditions and restrictions upon the use thereof, and as to the buildings to be erected thereon, and as to the use to which such buildings may be put." We are not surprised that, in view of the condition imposed upon the tenants on the Somerton Estate as to not using gas for lighting, the Directors of the Gas Company and their Engineer and Manager (Mr. J. Herbert Canning) were apprehensive that the powers asked for in the Bill would constitute a statutory confirmation of the action of the Corporation, might be used to the prejudice of the Company and their present or prospective consumers, and might deprive the latter of their freedom of patronage, and abrogate the statutory obligations of the Company to the extent of a similar condition (as to the use of gas) imposed in respect of all lands and premises which the Corporation sold, leased, exchanged, or otherwise disposed of. It is significant that the Corporation refused to give the Gas Company any protection or assurance in relation to the clause; and therefore the latter had no option but to petition against the Bill. What, however, the Corporation declined to do, a Committee of the House of Commons did on Tuesday of last week. They saw the righteousness of the Gas Company's claim; and perhaps they also saw that the Corporation were endeavouring to take an undue advantage of their position to obtain preferential rights which could be used to the detriment of their trading competitor, by depriving of freedom of patronage of one of the

agents for light, heat, and power the occupiers of such premises and lands as were covered by the (in its unqualified form) objectionable clause.

The upshot was that the Committee accepted the protecting clause for which the Company had originally asked. It now stands as sub-section 4 of the Bill, and reads:

(4) The Corporation shall not make or impose under the powers of this section, any term, condition, or restriction with respect to the form of light, heat, power, or energy to be used in any house, shop, office, warehouse, or other building, or on any lands, or with respect to the taking from any particular local authority, company, body, or person of any form of light, heat, power, or energy.

That is a just clause. It protects not only the Newport Gas Company, but the purchasing liberty of the occupiers of all premises with which the Corporation have anything to do. Not only that—the clause is framed in a catholic spirit, and secures unfettered trading in the community for the suppliers of any form of light, heat, power, or energy. It is a valuable precedent. It would have been particularly harmful to the gas industry had the Corporation secured the powers originally sought by them without qualification, for that would have given a precedent of which other municipal authorities trading in competition with gas companies might have availed themselves. We congratulate the Newport Gas Company upon their action, the resistance to which by the Corporation shows that the former did not, in our opinion, misinterpret the intentions of the latter.

An Ugly Shock for 43, Cannon Street.

An ugly shock has been administered to the company promoters who have made their nest at 43, Cannon Street; and we hope, now that a Government Department has got into close touch with Colonel Eaton and his associates or puppets, something will be done to make such effective public exposure that their activities will be much curtailed or, better still, altogether suppressed. People who consider that they are clever at the form of company promotion that has been carried on with such fervour from the address mentioned, sometimes make a false move which is a considerable disadvantage to them, and an advantage in revelation to other people, including their victims. What has happened is that the Barford Electric Supply Company, the shares in which were bought by the Eaton group and the associated concern the "Warwickshire and South Midland Electricity Supply Corporation, Ltd.," applied to the Electricity Commissioners for an Order, with the view possibly, if obtained, of utilizing it as a lever for extracting further money for this "enterprise" from the pockets of the easily misled section of the public on whom this type of promoter lives. The Leamington and Warwick Electric Company also applied for an Order; and this led to an inquiry being arranged by the Ministry of Transport, which was conducted by Colonel C. T. Ekin, assisted by Mr. W. Cooke. When the inquiry was held at Leamington, the Inspector soon found that there was no more intention on the part of these Cannon Street gentry of letting him peep further behind their financial scenes than they are accustomed to do in divulging to the public, when inviting subscriptions for capital, the exact financial position of, and actual business done by, the puny concerns which are their nuclei, and to which mostly big territorial names are given, and, to obtain proper symmetry and for other reasons, capital to match is sought. The Leamington and Warwick Electric Company ought to be thanked, by all who desire honest company promotion, for the part they, through their Counsel, Mr. Craig Henderson, K.C., took in bringing about the revelations in this case—revelations drawn from the reluctant mouth of Mr. C. A. Turner, who acts as auditor and accountant for several of the Eaton promotions, and whose admissions suggest that he works dutifully to instructions.

The inquiry occupied two days; and it was on the first day that Mr. Turner made what are described by one report as his "startling admissions," and felt somewhat the worse for wear after he had undergone a searching cross-examination by Mr. Craig Henderson, and pertinent questioning by the Inspector, who was evidently not altogether in the dark as to the character of promotion with which he had to deal. Among other points, the much prospectus-advertised Turner had to confess that Eaton had been attacked very severely in practically all the financial papers (others could be mentioned) with regard to undertakings which he had launched on the public; and attention was called to an uncomplimentary epithet that had been applied by "Truth" to Eaton, while witness had been described as his "tame auditor." Mr. Turner admitted that no notice had been taken of these hurtful epithets. Probably the high sense of delicacy that resides at 43, Cannon Street has prevented any action being taken, or maybe these men consider that their position in public estimation enables them to treat their critics with contempt. But the fact remains that the criticism that has been directed against their schemes from all sides has not tempted them to enter the Courts to prove the purity and soundness of their schemes and their philanthropic motives in offering the public "investments" carrying the promise on paper of high interest or remarkable dividends. On the second day of the inquiry, Colonel Eaton and Mr. Turner—probably discreetly—did not put in an appearance. We are not surprised. For Eaton to have to sit and hear during one day things such as were said about his guileless promotions must have lacerated his very soul; and Mr. Turner, we should imagine, had no particular wish to be at hand on the second day for further interrogation, should the Inspector or Mr. Craig Henderson have discovered during the adjournment fresh information they desired to elicit—especially in view of the fact that the Inspector had announced his intention of visiting the hydro-electric generating station before resuming the inquiry on the second day. Mr. Turner called it the "factory;" and Counsel stated that it was otherwise known in the district as "the old mill!"

It appears from the evidence that, before the Cannon Street group got the Barford concern into their hands, the capital consisted of 1200 ordinary shares of £1 each and 2200 preference shares of 10s. each. But Mr. Turner says the fully subscribed capital of the Company is now £23,024! Mr. Craig Henderson put this question: "So this little concern at Barford, valued at £3000, is made responsible for £10,000 loan capital, £15,000 share capital, the associated working Company has got 12,000 preference shares, nearly 12,000 debentures, and altogether £23,000 odd of subscribed capital?" Mr. Turner replied "Yes." The money was sought and obtained before the Order was applied for! A later question by Counsel divulged the fact that 62 women and 52 men were on the shareholders' list—the women having subscribed £6813, and the men £3344. "Don't you think that is pathetic?" asked Mr. Craig Henderson. And the estimable Mr. Turner replied: "I don't see that at all." That these people distribute their precious documents in no half-hearted way is seen from the fact admitted by witness that £383 had been spent on postages in circulating this Company's prospectus. That sum is equal to 91,920 pennies; thus Counsel was justified in putting the copies distributed at 90,000. Another interesting point is that in the preparation of the wonderful reports bearing the name of Mr. Turner, which appear in the prospectuses sent from 43, Cannon Street, or the provincial offices from which operations are sometimes conducted, that gentleman works to "instructions." Figures are placed before him; and from them he prepares percentages. Any schoolboy could do that. He had no books or figures available at the inquiry which were required either by the Inspector or Mr. Craig Henderson; and he acknowledged that the big percentage increases in revenue and business were simply prepared by him on the figures that the promoters gave him. And when people see these high percentages and the promise of big returns on their money, they must expect a risk—according to Mr. Turner. Of course, this depends upon who the people are. The prospectuses of these promoters, in the work of whom Mr. Turner professionally participates, reach all sorts and conditions of intelligences.

All through it was a sorry spectacle; but excellent service has been done to the public in getting so far

behind the scenes as to see how these things are worked. Another question put to the same witness was: "Has Eaton not 'rung the changes' from one company to another?" The reply was: "That is no business of mine, is it?" This gave Counsel the opportunity to say: "If you put 'is it' to me, I tell you I should make it my business to see it did not continue." To which Mr. Turner replied: "I did not say I should not take action in the matter; but I have not done so up to the present." Why not? Small wonder that the Inspector said he was very dissatisfied with the evidence of the witness—particularly in view of the fact that a letter was sent to the Company on April 6, stating that it would be necessary for the respective promoters to furnish the fullest technical and financial information; and yet regarding 50 p.ct. of the questions put to witness, he knew nothing. The local evidence was firmly against powers being granted to the Barford Company and its associate the "Warwickshire and South Midland Electricity Supply Corporation, Ltd.," for both of whom (if they are really divisible) Mr. Wilfrid Burton appeared. He seemed somewhat surprised at the course the proceedings had taken; and, before the inquiry closed, he took the opportunity of saying to the Inspector: "The evidence I have put before you is not of the nature I am used to dealing with." To this Colonel Ekin replied: "I hope for your sake it is not." It is a singular coincidence that one of the Directors of the Warwickshire and South Midland Electricity Supply Corporation, Ltd., and the Wareham Electric Supply Company is Wilfred (not Wilfrid) Burton; and Wilfred Burton—a Solicitor's Managing Clerk—subscribed for 100 founders' shares in the Electric Light and Power Contracts Finance Corporation, Ltd.—the three Companies progeny of the 43, Cannon Street clique. What we sincerely hope is that the disclosures on this occasion will have an effect on the operations of this promoting group which will be beneficial to the public. The best effect would be the final business extinction of these people, who obtain money from unsuspecting folk by the mean artifice of extravagance, and that vividly coloured.

Income-Tax Allowances for Wear and Tear.

It may be inferred from the useful little paper, read by Mr. W. M. Galleway, of Whitby, before the members of the North of England Gas Managers' Association last Friday week, that gas companies are still in existence who are not economizing, in one respect, in their outgoings to the extent that they might do. The contribution deals with a subject which has perennial interest for the secretaries and managers of gas undertakings—that is, income-tax allowances for wear and tear of gas-works plant, including meters (ordinary and prepayment), gas stoves, fires, &c. In effect, the paper shows the advantages there are to small or medium-sized gas companies in adopting the scheme for determining income-tax allowances for wear and tear and maintenance which resulted from the discussions and the work of a Committee representing statutory gas companies in negotiating, in 1912, with the Inland Revenue Authorities. The whole question at that time was a highly controversial one, and caused no end of vexation and worry to those who had year after year to treat of these matters. It was therefore a happy termination to the work undertaken, with masterly skill and diplomacy, by the Committee referred to, when a definite agreement was reached. Nearly everybody concerned was heartily glad, though a few critics still remained who thought that gas companies had not got all they should have. Perhaps they did not; but the fact was that they had obtained a settlement with the authorities which has proved invaluable. Of course, acceptance of the agreement was not compulsory. It could be adopted at will by gas companies all over the country; and to those who did not subscribe to it, appeal was open precisely as before. In view, however, of the fact that statutory gas companies representing a large proportion of the capital of private gas enterprise endorsed it, made it practically universal in its application. In the paper by Mr. Galleway the agreement is set out in the form in which it was published in 1912.

Three years later the scheme was adopted by the Whitby Gas Company; and although there was a little hesitation on the part of the surveyor of taxes in accepting the claim of the Company as originally presented to him, an inspection by him of the Company's books resulted in his admission of the correctness of the claim. The scheme was put into operation and worked until 1921, without any exception being taken by the Revenue Authorities, notwithstanding the fact that the allowance for wear and tear exceeded the amount of tax deducted for the interest and dividends paid annually to stock and share holders. About that time, however, a new inspector of taxes was appointed; and he refused to allow depreciation at the rates to which the Company were entitled, and which they had been allowed from the period of the adoption of the scheme. What the new inspector contended was that the Directors were compelled by the Customs and Inland Revenue Act, 1888, section 24, sub-section (3), to pay over to the Commissioners of Inland Revenue the full amount of the tax deducted from dividends and interest paid to the debenture stockholders and shareholders from year to year, irrespective of any claim which the Directors had for depreciation. His intention therefore was only to allow a sum equal to the amount written off annually for depreciation as shown in the statements of accounts. The result of this objection on the part of the new inspector is interesting, in view of the further confirmation it gave to the agreement. Naturally the Directors maintained they were entitled to the full allowance of 3 p.ct. on gasholders and 10 p.ct. on meters, gas stoves, &c., as provided for in the scheme, and that there was no reasonable ground for raising an objection to what had become an established precedent. Expert advice and Counsel's opinion were obtained, and both confirmed the Directors' contention. The upshot was that the inspector's objection was withdrawn. The scheme is therefore still in operation, and to the advantage of the undertaking, though it is an advantage which is only just.

Those gas companies who have not adopted the scheme should consider Statement B in the paper. This gives some idea of the benefits which have, since the scheme was put into operation, accrued to the Whitby Company and their customers. Looking at the figures, one can appreciate Mr. Galleway's opinion that those undertakings which are not under the scheme would do well to give serious consideration to whether it is not to their interest to claim the allowances which are granted by it. As a matter of fact, we cannot understand any statutory undertaking entitled to come under the agreement rejecting the certain allowances obtainable under it, unless they are enjoying fair treatment otherwise, and so are loath to disturb the existing arrangements.

A Big Coke Contract.

It has been known for a long time that at the Greenwich power station which supplies energy to the London tramways, gas coke is used with coal for boiler firing; and in the past, some good figures have been made public as to a considerable resulting economy. Among the contracts settled last week by the London County Council was one with the South Metropolitan Gas Company for 45,000 tons of coke for the Greenwich station. Knowledge of the large use to be made of coke at this important station may serve the good end of stimulating a greater interest among electrical engineers in the advantages for steam-raising of utilizing coke in company with the cheaper varieties of small coal and slack on (say) the "Sandwich" system. The coke position to-day urges that no effort should be spared to cultivate all the demand possible in every direction.

Special Orders and the One-Half Proportion.

Perhaps we did not in the note published last week make it altogether clear that one object of the Aldershot Gas, Water, and District Lighting Company in the Special Order for which they are applying to the Board of Trade is to continue, in their case, the temporary provision of the Public Utility Companies (Capital Issues) Act as to the one-half proportion of borrowing powers to paid-up capital. The Act will expire on the 20th inst. Mr. A. S. Campbell, of Wellingborough, points out the position in our "Correspondence" columns. He says: "The novelty of the Aldershot application lies in the fact that it is the first application for such temporary powers under the Act

to be made permanent "—that is, the extension of the borrowing powers to one-half the amount of the issued and paid-up share capital. As a matter of fact, it cannot be described as a novelty or a precedent. The one-half borrowing proportion is now a common clause in Special Orders, as it had been previously for many years in Gas Acts. Moreover, the Aldershot Company cannot, we find, claim novelty for continuing by Special Order the provision of the Public Utility Companies (Capital Issues) Act. In 1921, the Romford Gas and Coke Company, Ltd., obtained a "Capital Issues" Consent from the Board of Trade; and the Secretary of the Company (Mr. G. Berridge) calls our attention to the clause which they secured in their Special Order of 1922, and which perpetuated the one-half proportion of borrowing powers. The clause reads: "11.—(1) Section 14 (Limit of Borrowing Powers) of the Order of 1904 is hereby repealed. (2) The amount of all moneys borrowed by the Company, and secured by mortgage of the undertaking, shall not at any time exceed in the whole one-half of the amount of the capital of the Company for the purposes of the undertaking actually raised by the issue of shares or stock, including any premium obtained on the sale of such shares or stock."

Small Unit Nitrogen Fixation Plants.

Dr. Luigi Casale, the inventor of the Italian process for the fixation of atmospheric nitrogen, has been entertained to dinner in London by a number of scientists. On the occasion, the Technical Director of the United Alkali Company (Dr. G. C. Clayton, M.P.) made an important statement as to developments of nitrogen fixation in this country. He said that after the great war it was felt that the country must have an independent source of synthetic ammonia. A Haber plant is working satisfactorily at Billingham; but Dr. Clayton points out that this is only one plant, and might be a source of great danger in the case of air raids. In addition, the Haber plant, in order to realize the maximum success, must be installed on a large scale. This, according to Dr. Clayton, is where the Casale plant comes in. It can be made in smaller units and distributed throughout the country, and this segregation would greatly minimize risks from air raids. In this matter, Dr. Clayton is evidently a strong believer in "security first."

PERSONAL.

Mr. A. Cook, Assistant Engineer and Manager to the Warrington Corporation Gas Department, has been appointed Engineer and Manager to succeed Mr. W. S. Haddock, who retires on June 30.

Spontaneous Combustion of Coal.

Discussing, in "Industrial and Engineering Chemistry," the question of the deterioration and spontaneous combustion of coal in storage, Mr. S. W. Parr, of the University of Illinois, says it is difficult to summarize the information which he presents in terms of possible rating as to storage adaptability of specific coals. The fundamental factors involved, however, would seem to suggest the propriety of assigning storage qualities on the basis of size rather than type. For example, the high-moisture coals of the lignitic type would be set down as the most difficult, or impossible, to store without heating. The next in order of betterment would be the bituminous coals having from 12 to 15 p.ct. of moisture. The paramount factor in all bituminous coals, however, is fineness of division. This would include, of course, tendency to breakage, and the production of fines in the process of shipping and handling. Those coals which disintegrate least on weathering are less ready to start active chemical reactions in the pile. Lump sizes free from duff may be safely stored. In coals of the low-volatile type there is a low-water content and a greatly reduced avidity for oxygen; but these qualities, which should contribute directly to the storing properties of these coals, are frequently offset by structural peculiarities that contribute to the ease with which they disintegrate and develop fine material. However, it should be noted that, because of the greatly reduced absorption capacity of such coal for oxygen, the fines do not have nearly the danger that attaches to fine material from the high-moisture coals. Although initial reactions resulting in the development of heat may have their origin in the carbonaceous substance, independent of the presence or absence of sulphur, still it must appear that this latter element constitutes an added feature requiring consideration. But since the danger from sulphur largely centres in the duff, an added argument appears for eliminating the fine material from the mass.

ELECTRICITY SUPPLY MEMORANDA.

Colliery Super-Stations and Consumers' Charges.

The idea of big super-stations in colliery districts has lost much favour in electrical circles. The recession from the worship of such stations has been a gradual one. First, the experts began to wonder where the water for condensing purposes was to be obtained in proximity to coal mines. Then it dawned upon them that huge transmission systems running through miles and miles of rural territory, with little demand there, would be costly, upkeep great, and losses of electrical energy painful to contemplate. When they came to balance up things, the conclusion was reached that what might be saved on generating fuel at the pit-head would be more than swallowed up by the transmission costs and losses. Now labour developments are considered to be a factor; and there are doubts as to the wisdom of placing stations where the miners can, to serve their own ends, bring influence to bear upon them. The combination of miners and the Electrical Trades Union would indeed constitute a potent alliance with the means of generation located at the collieries. It is easy enough to vision some most unhappy consequences of such concentration of generation—if practically feasible—with concentration of labour power. In times of war, too, the collieries and the generating stations at them would form fine objectives for an enterprising enemy. Large dimensioned generating stations so situated, we are inclined to think, would be stoutly resisted by the electricity industry. The whole object of such location is cheapening of electricity supply. One way of bringing this about, without all the bother of reconstruction, would be by making it illegal for municipal authorities to extract profit from their electrical undertakings (and the same should apply to their other productive concerns), and to bring electricity companies under the sliding-scale system of price and dividends. Speaking of charges, no one in the electricity industry seems disposed to come forward with a scheme for selling electrical energy on the therm basis, so that the two competing industries would be on an equality—so far as the basis goes. We are afraid electrical men do not take the idea seriously. If they did, no one would be more surprised than we should be. If any electrical man would argue the matter in favour of adoption, he could drag in the support of the vaunted efficiencies of electrical operation. See how they would help him!

Tariffs and Development.

In the "Memoranda" for April 22, notice was made of two papers, which had recently been read at a meeting of the Institution of Electrical Engineers, on the subject of scientific two-part tariffs. It will be remembered that one of these was jointly by Mr. George Wilkinson and Mr. R. M'Court. In the discussion, there was a considerable amount of criticism of the methods proposed by the authors, chiefly on account of the additional complexity which it was thought would be introduced, and which would be altogether beyond the understanding of consumers. Mr. Wilkinson has contributed an article to the "Electrical Times," with the intention of disposing of the criticism. In his opinion, the opposition is largely due to the fact that the uniform tariff advocated has been examined and criticized on the basis of present-day development and experience rather than on the conditions which will obtain when electricity is commonly used for all labour-saving purposes, both in the house and in the shop. For the sake of the gas industry, we hope (and there is some basis for it) that the conditions which Mr. Wilkinson has in view will not develop. In the existing two-rate tariffs, he finds defects and glaring inconsistencies. Most of us have done that—in fact, their presence has been observed from the very introduction of the systems. Mr. Wilkinson is enthusiastic He believes that a closer investigation of the subject will probably establish the view that the enormous additional business waiting to be picked up at the very doors of every supply undertaking, which dazzles the eye and excites the mind of the imaginative, will never be attained while the existing tariffs remain. Present-day tariffs have, after many years of hard work and able management, approximated to an average load factor of about 25 p.ct.; but our friend who is trying to devise means for putting our industry to death asks what about the next 25 p.ct., and the possible next. Then he takes the case of an undertaking disposing of a modest top load of 3000 KW.

> With good management and economical operation we assume it has attained to a load factor of 25 p.ct.; and, therefore, in round figures, is disposing of 6,500,000 Board of Trade units a year. The cost of this service will, with modern plant, be round about 0·4d. for fuel, oil, and stores per unit sold, *plus* all the fixed charges. But what will be the cost of the next 6,500,000 units representing an increase in the load factor from 25 to 50 p.ct.? There are no additional fixed charges, there are no additional losses in the boiler-house, transformer excitation, meter shunts, &c. Therefore, as the additional load is to be obtained by spreading the supply over double the number of hours per day, the coal figure of 0·4d. per unit sold will be reduced in respect of the extra units by 25 p.ct.—viz., to 0·3d. Add 10 p.ct. for profit;

and we have 6,500,000 more units available for the use of consumers at the attractive figure of ¼d. per unit, or 13,000,000 units at the same low price if the load factor can be raised to 75 p.ct.

It is held by Mr. Wilkinson that present-day tariffs and methods of selling and use will not bring "this wonderful and perfectly possible boon upon the country; but it is attainable." The first essential towards demand is, he says, a two-part tariff with its fixed charge based on the electrical requirements of the consumer, with a very low price, (say) 0·33d. per unit, for all additional units taken. This tariff, in his opinion, will at once enable the consumer to relieve, on sound financial lines, his household and shop of much drudgery. Mr. Wilkinson is looking far ahead. Every electrical engineer has to consider his present practical conditions, and operate with them for his guide. He cannot assume the conditions of the future, nor can he apply to his present-day circumstances the unformed happenings of a distant period. Development to the point to which Mr. Wilkinson is aiming must come (if ever) by the process of evolution. We quite agree with him that, if a two-part tariff is adopted, the fixed charge should be based on the electrical requirements of each consumer. That is the only rational basis.

How is it to be Attained?

Mr. Wilkinson asks how what he suggests is to be attained? How can the extra energy be disposed of among existing consumers and usefully employed by them? We quote *in extenso* the answer he gives:

1. By a uniform tariff (two-rate) as set forth, based upon the electrical requirements of the household.
2. By wiring the consumer's premises on two circuits, the first being the "indispensable" circuit upon which electric service must always be available, and the second, which may be termed the "dispensable" circuit, supplying the water heating, part of the cooking apparatus, and such labour-saving devices as can conveniently be used during the periods of lighter loads.
3. By a system of automatic heat storage supplied from the dispensable circuit, and arranged to absorb energy off the heavy load periods, and dispense the same automatically to maintain uniform temperature in the rooms—supplemented with a low-power radiator on the hearth in the case of sitting-rooms. Also to furnish the necessary heat for cooking operations requiring boiling water, low-pressure steam, and the like.
4. A consumer's load regulator which will automatically protect him from imposing a greater maximum load upon the supply than he is entitled to under the terms of his supply agreement.
5. A thoroughly organized department from which the cookers, heaters, and current using and controlling devices can be obtained on attractive hiring terms or hire-purchase.
6. The employment of one cheap and effective two-rate discriminating meter only on each consumer's premises.

We sincerely hope, on behalf of the gas industry, that the electrical industry will put the proposals of Mr. Wilkinson into speedy operation; for we are satisfied that one of the best ways in which the latter can serve the former is by doing its utmost to confuse the consumers it obtains for various domestic purposes, and to run up the electrical equipment of houses to a point which will have throughout a district a still more impressive advertising effect regarding installation costs.

Artificial Light Through the Window.

We have had no innovations in the application of domestic artificial lighting for some time past. The variations are between direct, semi-indirect, and wholly reflected lighting. Now a new idea is presented to us by the General Electric Company. During day time, the light of a room is derived solely from the window or windows. If that is correct for daytime, why should it not be so for night time? The Company contend that the disposition of lights overhead or on the walls in the conventional styles is wrong; and the home of the future will be illuminated from outside the window at night, the same as by day—the difference being that, when the sun is not functioning for this particular purpose, then artificial light supplied from outside the window will take its place, so that people in the room may fancy they are enjoying brilliant sunshine, although there is rather a deficiency of the natural variety in these times. What the Company appear to be doing under this system is to instal a group of lights outside the window, in an arrangement (it is said) something like a fern case; and by this means the effect will be produced of sunshine streaming into the room. "It will be," one report states, "synthetic sunshine; but it will be precisely the same in appearance as the real thing." We are a little sceptical of this new idea. The intensity of light differs as the square of the distance from the source. With artificial light streaming through a window, a room would be unequally illuminated—much more so than with in the room a centrally disposed source of illumination. Persons standing or sitting before the sources of the artificial sunlight would throw uncomfortable shadows. We can imagine that two or three people reading in a room under such conditions would all be compelled to sit with their backs to the light in order to see the print. That would not be pleasant, unless they were on unfriendly terms. The more we think about the idea, the less we like it; but perhaps an inspection of the system may change our views. Anyway, the electricians make a point of the hypothetical evils of having gas lights in a room. The unnatural sunshine proposition will annihilate the electrical objections to gas lighting. If the economical incandescent gas lights are situated in a case outside the window, and the light from them streams into the room, they will be equally as advantageous as electric lamps—perhaps more so, because of the purity of the light and the economy of supplying it, especially with preheated cluster burners. Of course, there is nothing new in the idea as applied to shop window lighting. The lighting of goods inside shop windows after daylight fails has often been carried out by externally applied lighting; it is only in domestic lighting that the system has not hitherto been adopted. We are reminded, too, of the lighting of the House of Commons through the glazed ceiling of the Chamber. But that is top lighting. It is not the same thing as a window in one of the walls of a room. However, fancy having to equip all the windows in a house with outside light sources, protected by something resembling a fern case. We hope to be defended from having the pleasant views from any of our windows obstructed in this way.

Registration of Contractors.

We have not for some time past referred to this matter. As will be remembered, the scheme was designed with the view of obtaining an authorized register of electrical installation contractors, in order to provide all concerned with a list of the firms of recognized repute in the industry. The Registration Board have recently held their annual meeting; and it is interesting to note how far they have progressed in their work. It appears that the applications for registration up to the date of the last meeting of the Board (March 14) total 728, of which 670 have been accepted. No less than 46 applications have been declined and withdrawn; and twelve additional ones are receiving consideration. These figures do not suggest that the register has secured the adherence of any large proportion of the whole number of really competent electrical contractors in the country. In London and the suburbs, without the large provincial cities and towns, there is a plurality of contractors, and from those quarters one would imagine that a very high percentage of the accepted 670 contractors could have been obtained. We do not wish in any way to belittle the effort that has been made; but if the register is to be really effective in weeding-out undesirable contractors from the wiring business, then very much more than this will have to be done. It is interesting also to notice that six municipalities—Manchester, Hull, Wolverhampton, Bristol, Preston, and Croydon—have taken official action in support of the register by issuing notifications to the effect that they will only consider tenders from registered contractors. Several engineers of other municipalities have expressed sympathy with and approval of the register, although official support cannot be given by them until instructions have been received from their respective authorities. The method which has been taken to make the use of the register effective is by circulating the information among consultants and architects. There has also been an amount of reliance on the efforts of the registered contractors themselves, who, when submitting tenders, draw special attention to the existence of the register, and the guarantee as to standing and quality of work which is connoted by admittance to the register. It is observed that the Executive Committee are proposing to collect as far as possible a complete list of all the electrical installation contractors in the country, with a view to keeping before those not yet registered the advantages of registration. With regard to publicity, last year two printed lists of names of the registered contractors were circulated to the registered firms, supply engineers, consultants, and architects. A third list is now in preparation; and it is hoped shortly to issue this to approximately 10,000 addresses. Builders, it is mentioned, are the next group to be dealt with. In the gas industry we should also find acceptable some scheme which made a serious attempt to eliminate shoddy work and inefficient appliances.

Scottish Junior Gas Association (Eastern District).—A visit to the Leslie and Markinch Gas-Works has been arranged for next Saturday afternoon (the 16th inst.); and the annual outing will take place on June 6, at Anstruther.

How Gas Can Help the Cinema Industry.—Cinema proprietors are to-day seriously concerned at the high charges made for electricity for the lighting of the cinema arcs, and of the theatres themselves. They generally have to pay for current used at the lighting rates, which vary generally from about 4d. to 8d. a unit. It is not surprising to find, therefore, that many of them are now generating their own current on the premises. For this purpose they are installing dynamos driven by gas engines, and in most cases have found that they can, by this means, get all the current they require at an inclusive cost of from 1½d. to 2½d. per unit. Several cases are mentioned in the current issue (No. 134) of "A Thousand-and-One Uses for Gas" in which the bill for electricity has been reduced by one-half as the result of local generation.

THE NEW WEMBLEY.

OPENING BY THE KING.

ON Saturday last the 1925 Season of the British Empire Exhibition was declared open by H.M. the King. The British Nation have a gift for ceremonial pageantry ; and the pomp and circumstance of the opening ceremony, which was witnessed by over sixty thousand people, once more reminded us of our magnificent tradition, and of the importance and high endeavour of the Exhibition. The spectacular and musical splendour of the ceremony, and the unbounded enthusiasm of those who witnessed it, were fitting tributes to the efforts of all who have aided at making the Exhibition of even greater appeal than it was last year.

Last season Wembley challenged one of the worst summers on record; and though before noon on Saturday the sun shone brightly, it was a strange coincidence that, just as the Exhibition was declared open, there should be a shower of rain. It was, however, only a shower; and for the rest of the day the weather was delightful. Hope was that the last adverse effort of the weather god had been made, and that he had decided, after showing his strength, not to interfere with the success of the 1925 season of the Exhibition. On the opening day last year 63,000 people entered the Exhibition; this figure was nearly doubled last Saturday.

In asking the King to declare the Exhibition open, the Duke of York, who is the President this year, said that the date had been chosen as being the fifteenth anniversary of the coronation of the King. "The benefits which flowed to the Empire from the holding of the Exhibition in 1924," continued His Royal Highness, "were so marked that it was decided to continue it for another year. The 1925 Exhibition has integrally the same purpose as in 1924—to show how great are the resources available within the Empire; but while the Exhibition thus maintains the same character, it will present its lesson of Empire in a new manner. . . . The aim has been to provide not only a complete university of Empire, but a great pleasure and recreation ground."

POINTS FROM THE KING'S SPEECH.

The King, in reply, said: "The British Empire depends for its security and prosperity on goodwill between its constituent peoples; and the one sure foundation for that goodwill is a full knowledge of our mutual aspirations, capacities, and needs. To seek knowledge, more knowledge, and again more knowledge of the great heritage which has been entrusted to us, is the soundest Imperial policy. I recognize the British Empire Exhibition as a successful instrument of that policy. . . . This year the Exhibition has wisely decided to present its lessons in a lighter and brighter form. All who come here must receive some prompting to serious thought on their duties and responsibilities; those who come to be entertained will remain to be educated, and will return to be further educated. . . . It was a happy inspiration to make housing and housebuilding a central feature of the Exhibition. For the foundation of the Empire is in the home; and the provision of houses in which a healthy home life is possible is a matter not only of domestic but of Imperial importance."

Immediately after the opening of the Exhibition, a formation flight of eight aeroplanes swooped down upon the stadium, and then rose again and were lost to sight. This, perhaps, was one of the most impressive items of the ceremony.

WEMBLEY IN 1925.

All who visited Wembley last year will agree that the British Empire Exhibition is the most outstanding utterance of which our generation is capable. Wembley serves as a focus of the might, the achievement, and the progress of the greatest Empire that history has known; and it is for every citizen to maintain and encourage the new phase of a vast endeavour. There are certain features of this year's Exhibition which mark the measure in which the lessons of 1924 have been mastered. As one enters, one is glad to see that the absurdly inconvenient turnstiles of last year have been removed, so that people with figures resembling that of Dr. Johnson no longer have to suffer the indignity of passing through a special gate in order to enter the grounds. Also, the entrances themselves have been made more worthy of the Exhibition. Last year the roads at Wembley left a great deal to be desired. Most of the roads within the grounds have been practically rebuilt, and the monotony of the grey surface has been relieved in places by the use of coloured gravel. The surroundings of the Lake have been greatly improved by making new rock gardens, opening fresh approaches to the shores, and reshaping the islands. As for the gardens, these are much more beautiful. The mere fact that they have had a year in which to mature means much. Besides a matter of 100,000 spring plants which are now in blossom, great numbers of new ornamental shrubs have been planted, new lawns have been made at various places, and areas which last year were neglected have been converted

MR. D. MILNE WATSON, M.A., LL.B., D.L.
Chairman of the Gas Exhibit Committee.

MR. F. W. GOODENOUGH.
Chairman of the Executive Committee.

into attractive garden patches. Last Saturday everything was running smoothly inside the grounds, and in spite of the vast crowds, no rubbish was to be seen on the paths. During the opening weeks of the Exhibition last year, proper arrangements had not been made for dealing with this problem. In another article dealing with the uses of gas in the Exhibition, mention is made of the application of gas to the destruction of this rubbish.

With regard to the lighting of the grounds, the Authorities were so pleased and satisfied with the gas lighting last year that no alteration has been made. The electric lighting last year, however—and this was readily admitted by the electricians themselves—was inadequate; and the scheme of illumination by electricity has been considerably amplified. Coloured lights among the foliage of the trees, the picking out of the architectural features of the main buildings with lights in tinted bulbs, irradiation of jets of steam—these and other devices combine to make the appearance of the grounds by night better and brighter than it was last year.

British Government Pavilion.

No section of the Exhibition drew a larger patronage or louder praise in 1924 than the British Government Pavilion. The lions on guard, the towering columns, the effect of the windows of the Royal rooms—all attracted the attention of visitors, who found their hopes of an interesting display well fulfilled within the Pavilion. This year most of the attractions remain the same. The Fuel Research Board are again showing their laboratory apparatus for the assay of coal for carbonization purposes; and charts indicate the effects of heating by coal, gas, and electric fires. As before, there is an exhibit of the Lessing coal assay apparatus. There is also an interesting and exceedingly well-drawn series of paintings showing the development of heating from early times to the present day. This illustrates graphically the desirability of using only non-smoke-producing fuels for domestic heating.

Palace of Industry.

The Palace of Industry remains very much the same as last year. Working exhibits are the rule rather than the exception. Wherever it is possible, there is movement. The practice of joint furnishing and decoration by industries or by groups of exhibitors has been recognized and is largely in evidence, so that it is easier than before to grasp the significance, extent, and variety of any representative display.

The Gas Light and Coke Company provide a stand showing their well-known products, such as tar, ammonia, and cyanogen compounds, β naphthol, cresol, &c. The South Metropolitan Gas Company display thirty-five samples of "Metro" chemicals. The stand is in the form of four towers, separating intermediates, ammonia products, coal-tar derivatives, and heavy inorganic compounds. Each tower is surmounted by a brazier containing smokeless coke fuel.

The exhibit by the Association of British Chemical Manufacturers occupies 40,000 sq. ft. This year Brunner, Mond, & Co., Ltd., are exhibiting their grey pressed bricks, which are less pervious to moisture than the common brick. Specimens of silica of soda are again shown; and two comparatively little known uses for this material are receiving special emphasis. The first is a method of road making which has had excellent results in France and Switzerland. The process is similar to that employed in the case of ordinary water-bound roads, except that a mortar of fine limestone and silicate of soda is used to bind the whole together. A great advantage to be derived from the use of silicate of soda is that the best results are obtained with soft porous chalky limestone, which is normally worthless for road construction, and in many districts can be obtained much cheaper than the hard materials. The advantages to be gained by treating the surface of concrete with a solution of silicate of soda are again being emphasized.

Nobel Industries are wisely giving prominence to the products of their various subsidiary Companies. One of their Companies—Lighting Trades, Ltd.—demonstrate the knitting, manufacture, and testing of gas mantles—a working exhibit which is attracting a great deal of attention. Chance & Hunt, Ltd., of Oldbury, are among the Companies associated with Brunner, Mond, & Co., and are exhibiting with them at the same stand, as also are the Castner-Kellner Alkali Co., Ltd.

The Graesser-Monsante Chemical Works, Ltd., show interesting specimens of phenol and cresol derivatives. The stand of the United Alkali Company, Ltd., is arranged to indicate the various products of the Company which are used for particular industries—for example, dye making, dyeing, paper and glass manufacture, &c.

Last year a section of the Palace was set apart for the display of the results of technical research; several Universities and Institutes combining to make an exhibit which rendered possible an appreciation of the enormous amount of scientific investigation undertaken in the immediate past. This year this section, which as yet is not complete, contains a model of a gas-works—unfortunately of an out-of-date pattern. There is also a model of a column-guided gasholder by Ashmore, Benson, Pease, & Co., Ltd.; the Regenerative Coal Gasification System, Ltd., have a diagram of their single-stage coal gasification machine; Babcock & Wilcox, Ltd., show a marine water-tube steam boiler adapted for land purposes; and there is a model of an ammonia recovery plant in connection with producer gas. A showcase contains botanical specimens, due to J. Walton, of Victoria University, Manchester, which demonstrate the part played by plants in the formation of coal. The Rose Patent Fuel Company exhibit briquettes. Other exhibits indicate the value of ammonia sulphate as a fertilizer. The "Adco" process for the manufacture of synthetic manure from straw and other vegetable residues is explained. Perhaps the most interesting exhibits in this section are the models of the Woodall-Duckham Companies, referred to on a later page.

MR. J. WILFRID DRAKE.

Chairman of Council, Society of British Gas Industries.

Palace of Engineering.

Last year the Palace of Engineering told of achievement in a field which the English-speaking world has gone far to make its own. This year our needs, rather than achievements, are considered. These are better housing and better transport. In the housing section the visitor can see the varied types of houses that are intended to solve the problem of providing ample and comfortable accommodation at a moderate price. There are houses of steel and concrete, timber houses of a frankly utilitarian nature, and a concrete and oak combination. The display of building materials certainly presents many novelties. The railway exhibit occupies nearly 20,000 sq. ft. It shows not only the most modern of our equipment, but also the provisions which have been made to ensure both comfortable and safe travelling. Probably the most interesting feature of the motor section is the exhibition of mass production as applied to motor cars. The Ford Motor Company, Ltd., of Manchester, assemble cars; and an electrically driven moving platform, 100 ft. long, is seen in action. This conveyor moves between two rows of men, each of whom performs the operation allotted to him. By the time the last man has done his bit, the completed car slips from the conveyor, and can be driven away under its own power.

This year special attention has been given to caring for the children at the Exhibition, and in addition to a Children's Welfare Club, there is a "Treasure Island" which will delight the heart of any youngster. As for the Amusements Park, this is as gay and as popular as ever. As a technical and industrial Exhibition, the Wembley of 1925 cannot be considered an advance on the Wembley of last year; but there is no question that it is a brighter, more beautiful, and more entertaining place than formerly. It is to be hoped that the weather will be more favourable than it was last season. If it is, there can be no doubt of the success of the Exhibition.

"Examples in Machine Design."—This is a new volume published by Sir Isaac Pitman and Sons, Ltd. (price 6s. net), and written by G. W. Bird, W.Ex., B.Sc. It contains many typical designs illustrating standard engineering practice, and is suitable for students taking this subject for an engineering degree examination.

THE GAS SUPPLY TO THE BRITISH EMPIRE EXHIBITION.

By G. L. JENNINGS, Deputy Chief Inspector, Brentford Gas Company.

THE second Exhibition at Wembley will be supplied with gas by the Brentford Gas Company.

Readers of the "JOURNAL" are aware of the provisions that were made by that Company last year to afford the necessary quantity at a proper pressure; these remain practically the same as before. The gas is taken into the Exhibition through an 18-in. main, and the whole of the gas is supplied to the Exhibition Authorities, who are responsible to the Company for payment of all gas consumed in the Exhibition. This is advantageous, as a large quantity of it is consumed by the Exhibition Authorities direct. As a result, supplies to lavatories where gas is employed for the production of the necessary hot water, to lamps, Exhibition offices, fire stations, ambulance stations, &c., need not be metered, unless the Authorities desire to check the amount actually used at any particular place. All other consumers obtain their gas through the Authorities; and the amount is registered on various meters. In practice this is found to be the best method of dealing with large Exhibitions, as it reduces considerably the number of meters required.

SATISFACTORY SUPPLY.

The mains remain as before—a 12-in. circular main round the area, from which subsidiary mains of 6-in. and 8-in. diameter are carried. These are available for the necessary supplies to the exhibitors. The larger buildings—the Palaces of Industry and Engineering—are traversed by these mains, so that at practically any point a supply is available. The mains inside the Exhibition amount to a little over seven miles; and last year no shortage of gas was found at any point. As a matter of fact, with the exception of one from a consumer who doubled his use of gas without increasing the size of his meter, there was no complaint of any sort throughout the season.

EXTENDED USES OF GAS.

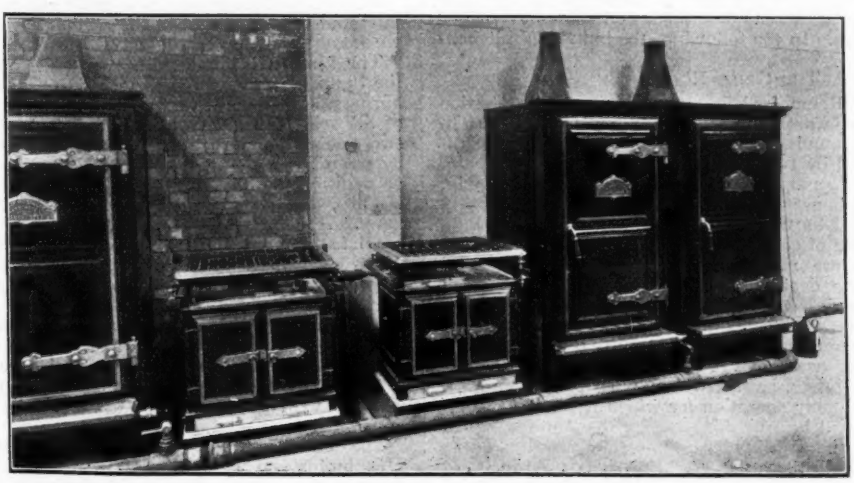
Gas will be used this year for practically the whole of the catering. Previously Messrs. J. Lyons & Co. did this catering, but this year it has been split-up among a number of firms. The gas apparatus installed by Messrs. Lyons, however, remains for the use of their successors. In addition the catering has been considerably extended; new buffets and cafés having been fitted up. There is now the "Excursionists' Restaurant," situated in the Palace of Transport and Housing, and so arranged that 7500 people can be dealt with for breakfast, lunch, tea, or dinner. It will not be available for the general public using the Exhibition, but will cater, as its name implies, for large bodies of excursionists visiting Wembley. Messrs. Allnatt's are running this special restaurant. To ensure quick service to so large a body of people, gas-heated hot closets in groups in various positions have been fitted, so that, after the joints have been cooked in the large gas roasting ovens (capable of roasting 2 tons of meat at a time), they can be kept hot and quickly served from the various groups of carving tables. There will be over twenty of these gas-heated carving tables in the dining hall. The vegetable cooking and necessary auxiliary services are dealt with in the kitchen; and for this purpose a 6-in. supply has been taken in, and an 800-light meter installed. It will probably be much the largest restaurant in the Exhibition. In addition, new cafés, with gardens, will be found behind the "Witching Waves" and close to the "Great Racer." Further buffets have also been installed in the Palace of Industry.

The Ceylon building, which originally had two tea kitchens, has now an additional large kitchen which will be run by Messrs. Gunters. The hot water for washing-up purposes will be supplied from two Potterton boilers; and gas apparatus has been installed for dealing with the necessary cooking. The Brentford Gas Company's "Regulus No. 1" cookers are in use for this purpose. British Guiana have also installed gas-heated apparatus to enable teas to be served in their exhibit. It is evidently the intention of the catering firms to see that full provision is made for dealing with the needs of the large number of people who are expected at the Exhibition this year. Additional gas supplies have been taken to the Gas Exhibit this year; and the main portion of the Exhibit, which was previously supplied with 300-light and 80-light meters, will now call for two 300-light meters.

GENERAL EXHIBITORS AND THEIR REQUIREMENTS FOR GAS.

Messrs. Carsons, the chocolate and confectionery firm whose exhibit and the whole of its working parts were driven by a Bonecourt boiler last year, have now installed one of greater capacity, and a 500-light meter has been fitted in place of the 250-light meter they previously had. Messrs. Baker Perkins are also calling for larger supplies of gas in connection with the gas-heated travelling ovens they are installing. West Africa also have demanded a larger supply. Other exhibitors are Messrs. Brown & Polsons, Messrs. Horlicks, Messrs. Poppetts, and Messrs. Burnards & Son, who are requiring large supplies of gas in connection with a gas-heated steam boiler. A 200-light meter has been installed for them. They are fitting a Cochran boiler, entirely heated by gas. An idea of the size of this will be conveyed by the fact that it is capable of generating 15 H.P. It will be used chiefly for the manufacture of ice cream for the exhibition; it will work in conjunction with an ammonia plant, and is capable of delivering ice in large quantities. The temperature of the rooms used for ice making will be 20° below zero—over 50° of frost. In addition, the steam from this boiler will be used for sterilizing and washing the milk apparatus. This exhibit will be well worth the attention of those interested in the use of gas. Messrs. Grimble & Co., in the Palace of Industry, Messrs. Green & Gordon, the Polivit Manufacturing Company, Messrs. Oxo, Messrs. Entwistle & Kenyon—all are using gas. Additional supplies have been laid to New Zealand and to the Anglo-Indian Pavilion. Then there are the Pure Confectionery Company, the Price Candle Company (who use gas in connection with the melting of wax and the making of candles), Messrs. Geiple, Messrs. Levey & Co., Messrs. Nobel, the Gourm Manufacturing Company, and Messrs. Maynards (for the manufacture of sweetmeats, &c.).

In addition to the gas required for catering and by exhibitors, the Exhibition Authorities need a large amount in connection with their staff requirements. For instance, gas-heated geysers are installed in various places for the use of the members of the Fire Brigade, the ambulance stations, and for the production of hot water in the lavatories. That this quantity is considerable is shown by the fact that during the period while the Exhibition was closed to the general public—that is to say, from the beginning of November last to the beginning of April—the amount of gas consumed in the Exhibition was $4\frac{3}{4}$ million c.ft. This quantity will, of course, be considerably increased as soon as the Exhibition is opened.



EXCURSIONISTS' RESTAURANT, SHOWING FLETCHER RUSSELL ROASTERS AND "REGULUS" COOKERS.

EXCURSIONISTS' RESTAURANT, SHOWING GAS COPPERS AND THE METER.

Lighting.

The general lighting of the Exhibition will be as before. There has been practically no change in this so far as gas is concerned. The lamps will be Messrs. Staniforth's 16-light "Wembley" type; and though the Amusement Area will present a new appearance through the re-arrangement of buildings, the lighting will remain as before. It gave great satisfaction to the Authorities last year; and they have decided to let it remain. It was hoped that there would be a considerable extension of this; but owing to the circumstances in which the Exhibition Authorities were placed, they have not seen their way to extend it.

In connection with the gas lamps in the Amusement Area, the method of arriving at the consumption of these was to meter a certain number of them, and then take the average consumption, which was under 34 c.ft. per lamp per hour. Having regard to the fact that each lamp had 16 mantles, and that the lamps were kept at their maximum efficiency, this is a figure which is quite satisfactory. The maintenance of the lamps will again be carried out by the Brentford Gas Company, who keep a special staff of maintenance men for this work. Every lamp is inspected daily, and the glass cleaned. In dry weather it is found that dust renders such daily cleaning necessary, in order to ensure the best results being obtained.

Gas and Electricity.

Reviewing the position generally, it is expected that the amount of gas consumed in the Exhibition this year will exceed that in 1924; though this must to a large extent depend upon the weather. The figures published of the number of heat units supplied to the Exhibition last year by the Brentford Gas Company may be of interest. They show the extraordinary preponderance of gas, calculated on a heat basis, over electricity. The figures were: Gas, well over 40,000 million B.Th.U.; electricity, slightly over 30,000 millions.

GAS IN THE CATERING ESTABLISHMENTS.

The figures given by the Chairman of the Brentford Gas Company, showing a very large consumption of gas at the Exhibition, have naturally drawn attention to where this amount is being used. In another article are described some of the directions; but it is felt that the catering at the Exhibition, and the gas consumed by that catering, have not been sufficiently dealt with.

In this article is given a description of some of the gas appliances fixed in the British Empire Exhibition. Last year the whole of the catering was done by Messrs. J. Lyons & Co., and the kitchens were all laid out by them according to their usual scheme for catering. When Messrs. Lyons decided to discontinue their contract, the kitchens were left by them fitted with all the apparatus, and available for whatever firm took over the work. The majority of these firms have continued with this apparatus, as described, and some have added additional appliances. In the following, the individual kitchens are described.

The Grill Room.

The large Grill Room is being run this year by Gordon Hotels, Ltd. This is probably the most important restaurant in the Exhibition grounds, and is the one in which most gas is used. It is supplied by two 500-light meters off a 6-in. main, and coupled to 4-in. supplies; the outlet runs are also 4 in. The kitchens, which are very roomy, contain large roasting ovens, and a special battery of Cox grills capable of dealing with a great number of chops and steaks. The roasting ovens and hotplates here are 15 ft. long. There are four of these hotplates, which can deal with enormous quantities of foodstuff. The salamanders are important; and there is a large installation of these. The consumption of gas in this kitchen at busy times averages as high as 8000 c.ft. per hour. The large carving tables are gas heated. This Grill Room was originally fitted by Messrs. Lyons, who fully realized the advantages of using gas in any operation for which it was feasible.

The Bank Café will be run this year by the Aerated Bread Company. This is the Café which at one time was known as the "Electric," though the amount of electricity used in it, so far as cooking is concerned, was *nil*. It is fitted with a Wright's "Eureka" cooker, a large fish frier with triple pans, a large gas-heated hot closet and a hot table fitted with Keith & Blackman's new self-cleansing burners. These burners have been installed in very large numbers throughout the Exhibition. They are fitted with a convex cap, and are surrounded by refractory material. The flame plays upon this, and cannot be stopped by reason of the spilling of any sugar or fat. If any is spilt, it is promptly burnt, and falls off. There is a 150-light meter here, and the service to this café is 3 in., fed from the 8-in. main laid in the Avenue.

The Wembley Garden Club.

The restaurant previously known as the Lucullus is now part of the Wembley Garden Club. The gas is supplied to this by a 300-light meter made by the Gas Meter Company, fitted with 4-in. supplies.

All meters throughout these cafés are controlled both on the inlet and outlet, so that in the case of exchanging a meter, the work can be done very quickly.

The kitchen is fitted with two "Falcon" stoves, made by the Falkirk Iron Company, with six ovens each and six boiling burners. There is a large Keith & Blackman boiling burner of the self-cleansing type; two double-tiered salamanders, and two double-tiered roasters. The hot closets here are heated by steam; and the boiling water is obtained from Still boilers. In addition there are a number of gas-heated closets.

The Colonnade Café is being run by the Aerated Bread Company. It has a 150-light meter and a 4-in. service. There is a hotplate here, fitted with a Keith & Blackman triple burner of the cleansing type, as previously described; also an 8-burner Keith hotplate, a gas-heated hot closet, a large gas-heated fish frier, two four-tiered Cox grills, a Wright's "Eureka" cooker, Still boilers, small toasters, additional gas-heated urns for milk, &c., egg boilers, and toasters and egg poachers combined.

The Orange Tree Buffet, previously the Garden Buffet, is supplied by means of a 2-in. service and a 100-light meter, and is fitted with gas-heated apparatus chiefly for producing hot water for teas.

The Tree Buffet is being run by Messrs. Bertram & Co. This buffet is very well named. It has two trees growing through the centre. It was felt desirable that as many trees as possible should be retained; and this is one of the few places

BROOK RESTAURANT (A.B.C.), SHOWING COX'S GRILLS AND ROASTERS.

where they are actually inside the building and growing through the roof. Visitors to the Exhibition should certainly see this interesting sight. The boiling water is produced in this buffet by means of Still boilers, of which three large ones are installed. The hot water for washing-up purposes is obtained from a Keith & Blackman circulating boiler. There is a 3-burner hotplate of the Keith & Blackman cleansing type, and a Wright's "Eureka" cooker. A 100-light meter and a 3-in. service supplies this buffet. The equipment here is typical of the whole of the buffets throughout the Exhibition, so that I do not intend to describe the remaining ones.

The Colonnade Restaurant, a "quick-lunch" café, is run by Messrs. Bertram. It is fitted with a Wright's "Eureka" cooker, a Keith Blackman circulating boiler, hotplates by the same firm, and Still boilers.

The North Institute deals with the supply of food to the workmen, and feeds a number of the employees in the Exhibition. It is fitted with Keith & Blackman hotplates, and large roasting ovens made by the Falkirk Iron Company. The boiling water is supplied by Still boilers. There is a 100-light meter and a 3-in. supply. The latter is carried on concrete piers across the brook which runs through the grounds. It can be seen under the Non-Stop Railway, adjoining the Wembley Park entrance to the Exhibition. It is a Mannesmann steel main, supplied off the 10-in. main carried through the Amusement Park.

Into the Brook Restaurant, which was previously known as the Popular, the Brentford Gas Company carried a 6-in. main, to which is attached a 500-light meter by Messrs. Parkinsons. There are two large roasting ovens made by the Falkirk Iron Company, a battery of four Cox grills, gas-heated fish frier, four large hotplates of the self-cleansing type, two salamanders, gas-heated hot closets, and a battery of Still boilers.

The Dancers Café is supplied through a 3-in. service and a 100-light meter. Its equipment is similar to the other cafés.

The Central Café, previously the Regent, is being run by Messrs. Buszards, and is a very good example of a gas kitchen. It was, of course, originally fitted-up, as all the other kitchens were, by Messrs. Lyons; and this, to a great extent, accounts for the similarity of the installations. It contains a gas-heated hot closet, a battery of Cox grills, large gas-heated ovens with hotplates 15 ft. long, large batteries of double-tiered salamanders, three large roasting ovens, and six Still boilers. In the pastry kitchen is installed a "Falkirk" pastry oven, together with Keith & Blackman's hotplate, with self-cleansing burners, for making custards, jellies, &c. This restaurant is supplied by a 500-light meter off a 6-in. main, and the kitchen is one of the best in the Exhibition. The premises are well ventilated and of adequate size.

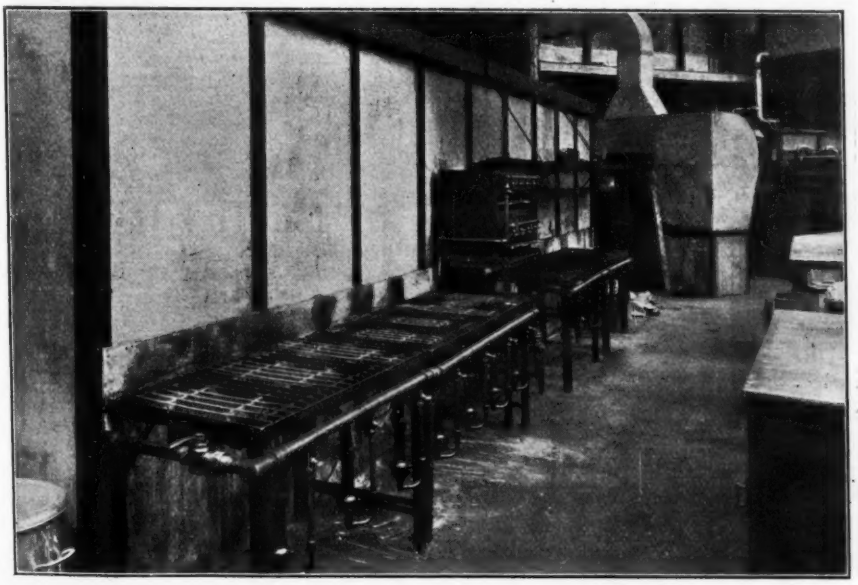
The Harmony Restaurant, which is being run by Messrs. Bertram & Co., is a "quick-lunch" café. This has a comparatively small kitchen, and is supplied through an 80-light meter.

The Grand Restaurant, which the Gordon Hotels are running this year, is fitted with large pastry ovens, two double-tiered salamanders, two large hotplates with ovens, and two large gas roasters. The meter supplying this is a 300-light, with 4-in. connections. This also applies to the buffet adjoining, where the installation is chiefly used for boiling water for the provision of teas. Still boilers are in use here.

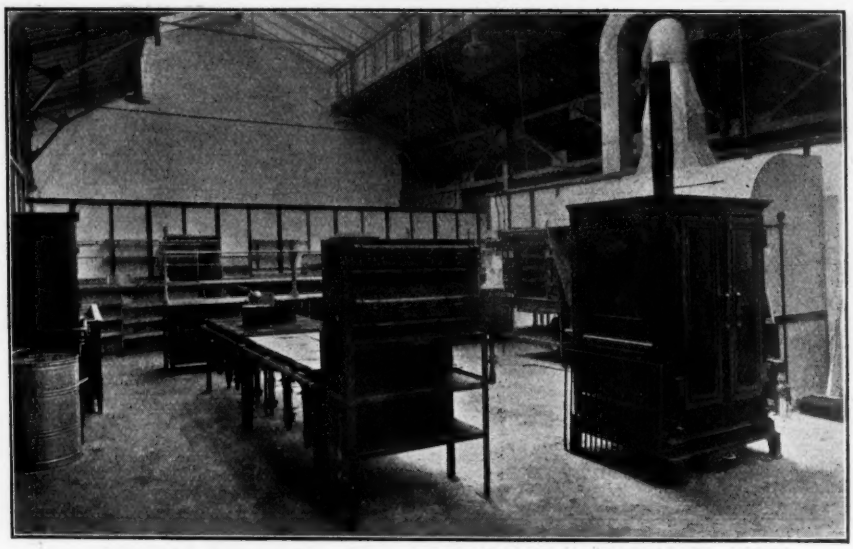
The Veda Café is now run by the Veda Bread Company. This has the usual equipment of an ordinary café, with extra cooking capacity; and for this the Brentford Gas Company's "Regulus No. 1" cooker is in use.

South East Institute.

There is also the South East Institute catering for employees of the Exhibition. The equipment of this is very similar to the North Institute, which has already been described. They are both run by Capt. Symons, V.C. The Institutes are naturally a great boon to the large number of people who are employed



BROOK RESTAURANT, SHOWING KEITH-BLACKMAN HOTPLATES AND SALAMANDER.



ENGINEERING EAST (HAYMARKET HOTELS).

in patrolling and caring for the grounds and gardens, and generally seeing to their welfare. It is important, of course, that meals should be ready quickly. For this purpose, gas has proved its efficiency, and is generally adopted for any purpose for which it can be used. To this Institute a 3-in. supply has been run, and a 100-light meter fixed.

The Institute is situated near the refuse destruction apparatus of the Exhibition, which gave great trouble last year. It was found that the wet refuse, orange peel, &c., would not burn freely, but smouldered and caused large volumes of smoke, which proved annoying to the visitors to the Exhibition when the wind was in a certain direction. The Brentford Gas Company volunteered their assistance; and each of the incinerators was fitted with a powerful gas burner. The effect of these burners was felt at once. Instead of the refuse being difficult to deal with, and causing great annoyance, it was very quickly burnt, and with practically no smouldering.

In this portion of the Exhibition are the living quarters of the natives. They are located in wooden huts; and the Brentford Gas Company have carried-down a supply of gas, to do some of the necessary cooking for them. The plant has been installed here by the Gas Light and Coke Company, under the supervision of Mr. Smithers.

Chinese Restaurant.

The gas equipment of the Chinese Restaurant in the Hong Kong Section was also installed by the Gas Light and Coke Company; and for this again Mr. Smithers was responsible. It consists of three large hotplates specially designed to meet the requirements of the Chinese cooks, a small hotplate, a "Regulus No. 1" cooker, and two gas-heated coppers. The necessary hot water for washing-up purposes is provided from a Ewart "Califont" geyser, and water is supplied by a gas-heated boiler by Messrs. John Harker & Co. There are also small vegetable steamers by Summerlings. The supply is through a 100-light meter off a 2-in. service.

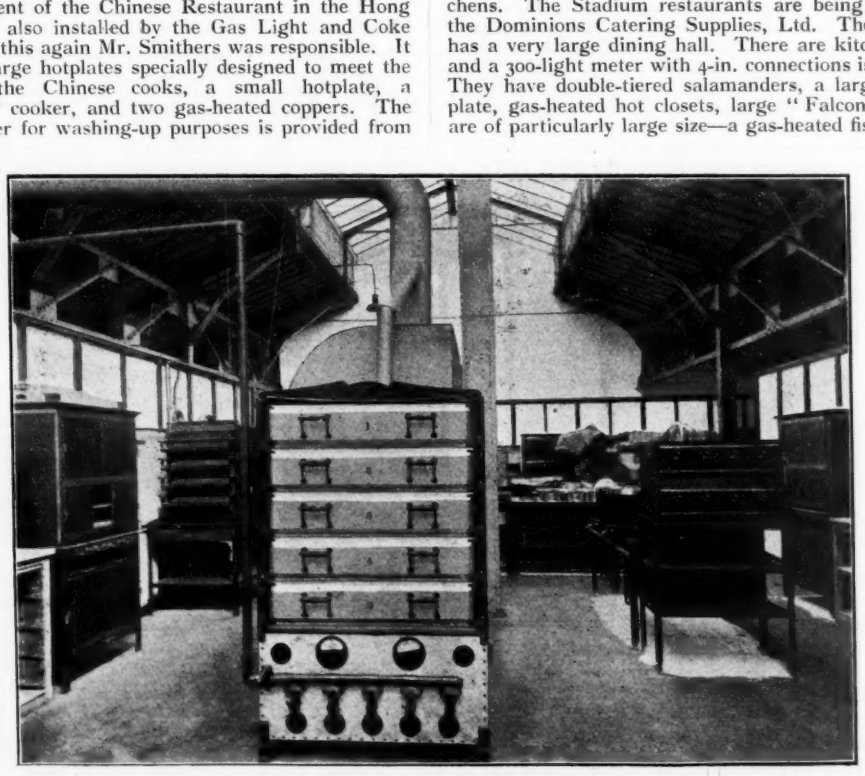
The City of Bath utilize gas to illustrate their natural hot springs, for which Bath is so well renowned. The water is heated by means of a "B.T.U." boiler, and a thermostat is used so that the temperature of the water is the same as that available at Bath. In practice the boiler is found to carry out the work of throwing up and circulating the hot water in a very efficient way.

I have already, in a previous article, described the new kitchen of Ceylon. In addition, the two old kitchens will be used for cooking. There are two Keith & Blackman water boilers, Still boilers for tea making, and a small hotplate in each of the kitchens.

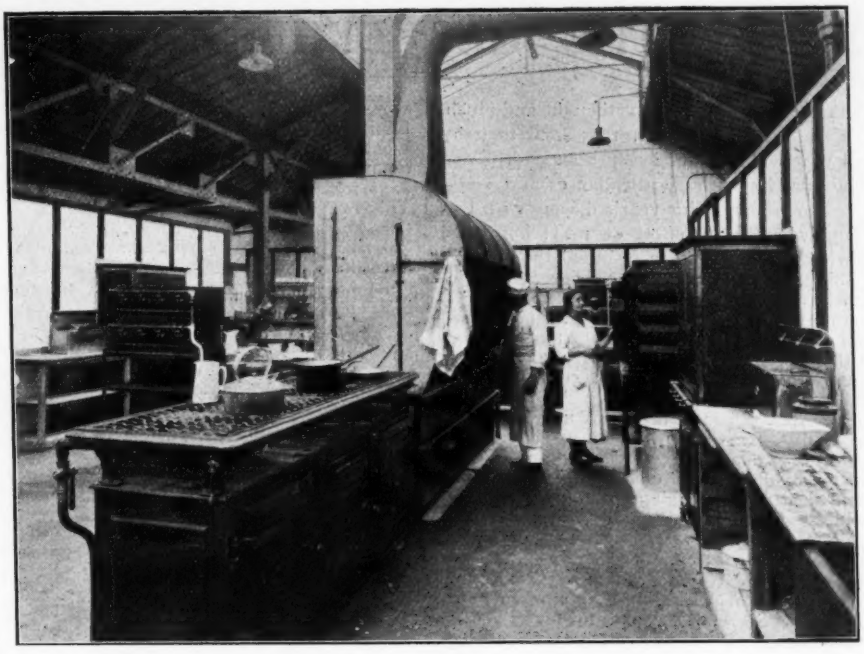
In South Africa a new restaurant is being installed. There are a Keith & Blackman circulating boiler, a hotplate fitted with the self-cleansing burners, Still boilers for the necessary boiling water, and Still grills for toasting scones, &c. It is supplied off a 2-in. service and 100-light meter.

The Stadium.

In the Stadium, through the tunnel, a 6-in. supply is carried, connecting with a 4-in. main which supplies the Stadium kitchens. The Stadium restaurants are being run this year by the Dominions Catering Supplies, Ltd. The main restaurant has a very large dining hall. There are kitchens at each end, and a 300-light meter with 4-in. connections is installed in each. They have double-tiered salamanders, a large gas-heated hotplate, gas-heated hot closets, large "Falcon" roasters—these are of particularly large size—a gas-heated fish frier, three Still



ENGINEERING WEST (MESSRS. PRITCHARDS).



PALACE OF INDUSTRY EAST.—A.B.C. KITCHEN, SHOWING FISH FRYER, GAS OVENS, AND SALAMANDERS.

boiling burners for the necessary boiling water, a number of gas-heated milk urns, and a large gas-heated toaster and egg poacher combined, of the pattern used by Messrs. Lyons.

There is a 4-in. main right round the Stadium. This is fed through the 6-in. main already referred to; and there is a 4-in. main on the other side of the Stadium.

Around the Stadium there are eight buffets. These are fitted with Still boilers for the necessary boiling water, and Keith-Blackman circulating boilers for the hot water for washing-up glasses, cups, &c. The whole of the buffets are fitted in identically the same way.

The New Café is supplied by means of an 80-light meter off a 3-in. service. Here there is a Wright's "Eureka" cooker, five boilers for the necessary boiling water, a gas-heated hot closet and milk urns, and a large hotplate with four Keith-Blackman burners. This café is run by MacFisheries.

A new departure is a Gentlemen's Hairdressing Saloon. The necessary hot water is supplied by a Ewart's "Radion" cylinder.

In close vicinity to this saloon are the new premises of the St. John Ambulance Brigade. The Brentford Gas Company have fitted-up gas fires here, so as to ensure the necessary warmth in case of accidents or any emergency.

The Alderman Café is supplied by an 80-light meter off a 3-in. service. It is fitted with a large Keith & Blackman hotplate, gas-heated egg boilers, three Fletcher Russell toasters, five Still boilers, and a number of gas-heated milk urns; also a Wright's "Eureka" cooker.

Each of the catering firms has an Administration Office, to facilitate the necessary control and supervision of their organizations. To each of these a gas supply has been run. In these premises the pasteurization of milk is carried out, which is then distributed to the various cafés, buffets, &c.

There is a South-West Institute for the Exhibition employees. This is installed with gas appliances in the same way as the North and South-East Institutes.

West Africa.

Messrs. Buchanan Scott, Ltd., are doing the catering in West Africa. There is a Still boiler for the production of hot water, a Keith & Blackman circulating boiler for washing-up purposes, a hotplate fitted with the new self-cleansing burners, and a No. 1 "Regulus" cooker. This is supplied by a 150-light meter off a 3-in. service.

In Nigeria there is a 300-light meter installed, for running a large Spencer-Bonecourt boiler. The evaporating power of this boiler is 3000 lbs. per hour. The power will be used for crushing nuts and extracting oil. There is a 4-in. supply.

The Indian Restaurant is being run by Messrs. Veerasawmy. It is fitted with three "Regulus" cookers, three large Keith & Blackman hotplates and double-tiered toasters, two Cox grills, a large gas-heated hot closet, additional boiling rings, &c., together with a 4-panned fish frier. This is supplied by a 200-light meter with a 4-in. supply. The boiling water is supplied by Still appliances.

Engineering and Industry Restaurants.

The Engineering East Restaurant is being run by the Haymarket Hotels. The supply is through a 400-light meter; and here again there are gas-heated fish friers, batteries of Cox grills, Wright's "Eureka" stove, Keith & Blackman boiling rings, salamanders, and toasters, and Still boilers for the production of the hot water. In the kitchen above is a similar equipment, with additional large roasting ovens and gas-heated egg poachers.

In the Engineering West Restaurant there is the usual equipment of a large kitchen—toasters, hotplates, Cox grills, egg poachers, fish friers, and two Portway "Tortoise" stoves. This stove is spoken of very highly by Messrs. Pritchards, who are running this restaurant. They say that they have had these stoves in operation in other of their branches, and they have given great satisfaction. The kitchen above is similar, and shows practically the same apparatus. We show a photograph of the stove referred to. A 400-light meter is fitted here with 6-in. supplies.

In the Industry East Restaurant, which is being run by the Aerated Bread Company, there is a 400-light meter and 4-in. supplies. They have installed two Richmond large roasters, a Keith & Blackman hotplate, a large fish frier, gas-heated carving tables, batteries of Cox grills, Still boilers, gas-heated milk urns, hot closets, &c. The kitchen above and the Palace of Industry West Restaurant are practically identical.

Children's Welfare.

With regard to Children's Welfare, it might be advisable to mention the preparations made for the reception of children who are lost in the Exhibition and require care. For this they have installed gas fires. An Edgar geyser supplies the necessary hot water for emergencies, and gas-heated appliances are fixed for cooking any food required.

The Domestic Grate.

Technical Paper No. 13 of the Fuel Research Board has just been published. Entitled "The Domestic Grate," this is an account of an investigation, by Dr. Margaret W. Fishenden, of the relation between the design of a grate and the heat radiated into a room. In a brief summary the author states that the following are important factors in the efficient utilization of open fires for warming purposes: (1) The use of correctly-designed grates, properly fitted, in order that the maximum possible proportion of the radiation emitted by the incandescent fuel may be directed into the room; (2) the provision of adequate draught control, so that not only may the fire be rapidly adjusted to meet varying requirements, but also the air flow through the room be reduced to the minimum consistent with the demands of hygiene and comfort; and (3) efficient insulation of the room, so that the temperature rise effected by a given energy input may be as great as possible. Dr. Fishenden mentions that the very gradual rise in temperature which an open coal fire induces in a room is one of its most serious drawbacks, especially for intermittent use. It is just during the period immediately following the kindling of the fire, when the room has not yet had time to get warmed-up, that a maximum amount of radiation is needed for comfort; and actually, at this stage, the fire is giving a minimum radiation emission. It is stated that it is doubtful whether the radiation efficiency of open coal fires against a wall can easily be increased beyond 30 p.ct. or 35 p.ct. of the theoretical energy of combustion. The publication is obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, price 9d. net.

THE GAS EXHIBIT.

There is evidence of the bestowal of great thought and much work on the British Empire Gas Exhibit, 1925—and thought and work of a kind that will be abundantly rewarded, given the fine weather that should spell huge attendances at Wembley. There is no need to compare this year's display with the excellent and thoroughly successful effort of 1924; but it is manifest that certain circumstances have favoured the present occasion. For one thing, there is available considerably more ground space, which has been taken advantage of to provide, for one thing, a separate Demonstration Hall, in which a knowledge of cookery, and of the efficient use of gas for the purpose, will be imparted to those desirous of acquiring it under conditions of greater comfort than were possible last year. And in planning the 1925 exhibit, of course, those responsible have had the experience of 1924 to guide them in the fixing-up of various details. In addition to this, the Committee, by good fortune, have had the opportunity, as explained towards the end of the following account of the exhibit, of introducing this year two special features which must make a wide appeal.

Gas is again worthily represented at Wembley, and for this the gratitude of the industry is due to Mr. D. Milne Watson (the Chairman) and the members of the British Empire Gas Exhibit Committee, to Mr. F. W. Goodenough (Chairman of the Executive Committee), to Messrs. J. E. Henwood and J. C. Walker (Joint Hon. Secretaries), and to Mr. A. E. Broadberry (the Hon. Treasurer). Mr. H. Austen Hall, F.R.I.B.A. (Architect to the Committee), has again given of his best; while the work of the contractors (Messrs. Osborne & Co.) has left nothing to be desired.

The Exterior.

Approaching the Gas Exhibit by way of the familiar avenue through the Palace of Industry, one is immediately influenced by the appealing nature of the exterior. This is a good thing; for everyone knows the importance of first impressions. And the favourable impression being made, further investigation will surely follow.

There has been painted as a background to the whole of the front of the building a very artistic view of a gas-works—not such a picture as is too often associated with a gas-works in the minds of the public—and the whole of the space on the outside has been given over to industrial exhibits. This imparts the atmosphere of life and movement which experience has shown to be so important in connection with displays to attract the close attention of the general public.

Last year, it will be recalled, there was on the one side of the main entrance to the Gas Pavilion a smoke abatement exhibit, and on the other a sulphate of ammonia display. Both these proved exceedingly popular—particularly from an educational point of view—but it was felt, nevertheless, that the smoke abatement exhibit especially, convincing and well arranged as it was, lost considerably in effect from the magnitude of the Palace of Industry under whose spacious roof it was placed.

Therefore, in that space—*i.e.*, on the east side of the porch—there have now been placed a big gas engine of 180 H.P. over 9 ft. high, and a smaller one of only 20 H.P., each illustrating the use of gas for power. Adjoining these is a 10-ft. long gas-fired travelling oven, showing wafer or biscuit baking in actual operation.

On the other side of the porch, where formerly was the sulphate of ammonia exhibit, the many applications of gas to the motor manufacturing industry are demonstrated, and emphasis given to the value of benzole as a motor spirit. The space is "flood-lighted" by high-pressure gas lamps installed on "benzole roadside pumps" in lieu of ordinary columns—the necessary pressure being afforded by the motor engine that is shown being "run in" by gas, which is more economical for the purpose than petrol or benzole. There are here, in addition to the chassis of a motor car, all the appliances in which gas is used for making the parts of the car.

Overseas Dominions Hall.

Having seen so much of general interest on the outside, the visitor will wish to examine the further attractions that he will feel convinced await him on the inside. Entering through the porch between the two exhibits just referred to, he will find himself in what has been named the Overseas Dominions Hall; and there will be no desire to leave it before a thorough inspection has been made of the contents.

The great point that the British Empire Gas Exhibit Committee are wanting here to bring home to people is that gas is still a vigorous and growing industry, which is, in fact, increasing in activity day by day, not only here but in other parts of the world; and hence they have, by means of the display in this hall, linked-up the industry with Overseas. The result will interest everybody, and will serve to remove from that portion of the public mind which still harbours it the idea that the gas industry is simply carrying on in the Old Country because it was started there, and is not making headway elsewhere. The true position is, of course, that the gas industry is "going strong" throughout the Empire's wide Dominions. There are, indeed, some 200 undertakings which manufacture gas in Australia, New Zealand, and Canada alone; and their business is steadily growing in dimensions. This last remark does not even exclude Canada, where electricity is extraordinarily cheap.

To press home the point they had in view, the Committee have illustrated in the Overseas Dominions Hall—which is, it must be unnecessary to say here, throughout lighted by the most efficient and artistic gasfittings—the multifarious services of gas in the homes of the Empire; but the apparatus shown is all of a type equally suitable for homes in the Mother Country. City scenes in the Dominions Overseas have naturally been chosen; and it is well known that the more luxurious homes in those Dominions mostly show a marked English influence. This will make the exhibit thoroughly practical from the point of view of the use of gas in this country. Each corner of the hall is occupied by a domestic scene from one of the greatest Overseas Dominions—Canada, Australia, South Africa, and India—and across these corners are the coats of arms of the Dominions, modelled in plaster and brilliantly coloured.

Canada.—The Canadian scene depicts an entrance hall, and shows gas-heated radiators supplemented by a gas fire in one corner of the room. Out of this hall will be found a "Kitchenette" showing the arrangements and equipment for cooking purposes in the average Canadian home. Everything is close to the hand of the cook, and the gas cooker is of the most modern type—raised so that no stooping is necessary, and provided with an automatic heat regulator, &c. From the window of the hall can be caught a glimpse of a typical Canadian landscape.

Australia.—In the opposite corner Australia is represented by a delightful children's nursery, the windows of which reveal the famous view of Sydney Harbour. Out of the nursery opens the children's bath-room—a very attractive place for the youngsters, with strange fishes depicted on the tiles around the upper half of the room. The bath itself is slightly sunk. This scene, of course, displays gas water-heating apparatus.

South Africa.—The South African tableau depicts an old Dutch-interior sitting room, with the brick fire-place adapted for use with a gas fire. The furniture is typical old Dutch hardwood; the seats of the chairs and settee being composed of strips of hide.

On one side of this sitting room is a kitchen or "still room," where fruit bottling will be in constant operation. Although this is next door to South Africa, it is not intended to link it too definitely with that country, since both Australia and Canada have large fruit-bottling industries; and, by means of publicity matter, this scene can be connected with all three Dominions.

India.—India shows a bathroom with a gas water heater, and a pantry next door with a refrigerator operated by gas, providing small blocks of ice convenient for use in drinks, and ice creams and other forms of set dishes, as well as the cold storage so essential in the climate of India. On the other side of the bathroom has been arranged a strip of verandah, where the dummy figure of a native seated illustrates the brilliantly coloured materials so beloved of the natives, which owe their colouring to the dyes obtained from coal tar.

New Zealand.—The remainder of the space on one side of the hall is occupied by a tableau representing New Zealand. This consists of a luxurious bedroom and boudoir, the windows of which look on to beautiful typical New Zealand scenery.

A Pioneer's Store.—On the opposite side of the hall there is the interior of an up-country store, such as the pioneer depends upon in every Colony or Dominion. The contents of this serve to illustrate the manifold resources and uses of the gas industry—the whole of the stock being either bye-products of the gas industry, such as disinfectants, drugs, fur preservatives, sheep-dip, &c., or articles in the manufacture of which either gas or one of the many bye-products of gas making is habitually used. This exhibit will prove excellent for emphasizing the widespread use in industry of gas and its bye-products.

The cabin has not been linked-up with a particular Colony, because it may apply to any one.

Gas Fire Exhibits.

In the centre of the Overseas Dominions Hall are three hexagonal pylons as last year, each showing six different types of gas fire in all kinds of suitable fireplace surrounds, varied from those shown in 1924.

The decoration of the hall itself is in white; and the ceiling consists of cream-coloured gauze stretched over batons—the general effect aimed at being that of a more sunny climate than is usually experienced in this country.

A Luxurious Lounge.

A charming Queen Anne period lounge has been arranged in the space which joins the hall just described and that to which reference will now be made. It is handsomely panelled,

and opportunity has been taken to display a very fine gas fire of appropriate design.

THE HALL OF GENERAL EXHIBITS.

Entering from the lounge the second hall—known as the Hall of General Exhibits—and turning to the right, there is found first a garage and chauffeur's workshop, illustrating the applications of gas to the heating and lighting of a private garage by means of safety gas-heated radiators and safety gas lamps, and the uses of gas for brazing, vulcanizing, &c.—so helpful to a chauffeur-mechanic. Next to the garage are the chauffeur's parlour-kitchen and scullery, fitted with a gas cooker, gas-heated copper, water heater, iron, a gas fire, and, of course, gas lighting fittings.

SMOKE ABATEMENT EXHIBIT.

On the opposite side of the Hall of General Exhibits the chief feature is a smoke abatement exhibit, consisting of two rooms identical in decoration and furnishing—the one showing a coal fire polluting the atmosphere with smoke and making everything inside the room dirty, while the other demonstrates the scientific use of coal (by its treatment at the gas-works, and the distribution of its purified "spirit" in the form of gas) and the cleanliness and brightness that would be our heritage if open coal fires were unknown in London.

By means of theatrical lighting effects, the windows of the first room look-out on a foggy scene, and those of the second room on to a nice clear sky.

GAS FOR VARIOUS PURPOSES.

The Greenhouse.—Next to the smoke abatement exhibit is a greenhouse heated from without by a gas-fired boiler, and containing an attractive display of flowers.

The Shop Window.—Adjoining this greenhouse, and flanking the northern entrance to the exhibit, there will be found a shop window showing effective gas lighting of such premises, and containing an interesting display (suitable for a gas company's showroom window) illustrating the many bye-products of different kinds obtained from the carbonization of coal, but lost if coal is burned in open grates.

The Domestic Laundry and All-Gas Kitchen.—On the other side of this entrance, there has been erected a working domestic laundry suitable for a large house or private hotel, and alongside it a model all-gas kitchen suitable for such a house.

The Hotel Kitchen.—Opposite to this is a complete hotel kitchen containing gas apparatus suitable for every description of cooking.

In the space where the cookery demonstrations were held last year, a number of armchairs for the comfort of the public have been placed.

Converted Coal Grates.—The central space in this hall, which was in 1924 taken up by industrial working exhibits, is this year occupied by a demonstration of how gas fires can be installed in front of existing coal grates, so as to make a harmonious heating unit.

Hobbies and Pottery Making.—There is also a working display demonstrating how gas is applied to many hobbies; and a very interesting show of pottery-making by the disabled ex-Service men employed at the Ashtead Pottery.

LECTURE AND DEMONSTRATION HALL.

Beyond the west end of the Hall of General Exhibits has been provided—and it will certainly be regarded as a great improvement upon last year's arrangements—a separate quiet hall 50 ft. square, which will be devoted to frequent practical lectures and demonstrations for the assistance of housewives in securing the most efficient and economical results from the use of gas, not only for cooking, but also for all other domestic operations involving the use of heat or light. Around this Demonstration Room will be found a selection of the most up-to-date gas cooking, water heating, and other catering appliances; and also a very interesting installation of gas-heated fish-frying apparatus, which is becoming popular in the trade.

The present arrangement has, of course, enabled a lot more apparatus to be put in than was possible last year—which should lead to the enhanced satisfaction of all concerned.

A COKE EXHIBIT.

A space between the Demonstration Annexe and the main gangway has been taken by the Gas Light and Coke Company, who are making, at their own cost, a special display of coke appliances, mainly for domestic use.

A SCENE IN THE GAS EXHIBIT ON SATURDAY.

[Other Photographs of the Completed Exhibit will appear in Succeeding Issues of the "JOURNAL."]

Here are to be seen an artisan's kitchen, a model kitchen, and a bathroom, showing different types of open grates using coke, and an anthracite stove running on coke, as well as several types of coke boilers, both working and otherwise. Here are shown in use the different sizes of coke suitable to the varying requirements. In fact, it is convincingly demonstrated that coke can displace coal for any domestic purpose.

Prof. Boys' barless grate for the consumption of coke is on view, as are also some models of industrial appliances for use with coke.

THE SIDE GANGWAY.

Along the side gangway are exhibits of gas appliances for use in various industrial processes, together with samples of the finished products in the making of which gaseous fuel is employed. These appliances include furnaces, crucibles, ovens, and blow-pipes of all descriptions. The finished products comprise motor gears, false teeth, printers' type, pea nuts, toy soldiers, engravers' dies, buttons, tools, aluminium castings, pottery, rivets, sweetmeats, varnished toy models, feathers, glass bulbs, telephone magnets, &c.

EMPIRE FOOD STUFFS.

Since arrangements were made for a separate Demonstration Hall, a Special Committee for organizing propaganda for

increasing knowledge and use of Empire Food Stuffs in the Home Country (presided over by Lady Galway, who is Chairman of the Executive of the Women's Section of the B.E.E.) have asked for the assistance of the British Empire Gas Exhibit Committee in the matter of lectures and demonstrations in the Cookery Demonstration Hall on the purchase, preparation, and cooking of Empire Food Stuffs. The Gas Exhibit Committee have agreed to lend the hall and to provide the lecturers and demonstrators—who will be furnished with all necessary information by the Empire Food Committee—and to arrange, in consultation with the Empire Food Committee, a programme of daily lectures and demonstrations to fit in with those already being planned on gas cooking and other aspects of domestic economy in which gas plays an important part.

The Gas Exhibit Committee will exercise full control over all plans. The Women's Section of the B.E.E., in conjunction with the Gas Exhibit Committee, will arrange for widespread publicity, and for well-known men and women, both from the Home Country and the Dominions, to take interest in the scheme, as well as for their frequent attendance to preside at lectures, give receptions, and otherwise show their sympathy with the movement. H.M. The Queen is Patron, and H.R.H. The Duchess of York is President, of the Women's Section.

Society of Women Journalists.

Inquiry was lately made by the Society of Women Journalists as to whether it would be possible for the Gas Exhibit Committee to afford women journalists visiting Wembley—not only from London, but from the Provinces, and also from the Dominions and Colonies—some accommodation for rendezvous, rest, writing, &c. The Committee immediately offered, and the Society gratefully accepted the offer, to fit-up for their use as a reception bureau a suitable room in the offices that had been constructed behind the Demonstration Hall. This room has been furnished free by Messrs. Osborne & Co.

Upon this special feature, and the arrangements that have been entered into in connection with Empire Food Stuffs, the Gas Exhibit Committee should be particularly congratulated; for they must result in making the exhibit a centre of interest for all women visiting Wembley, and at the same time ensure an exceptional amount of publicity.

BRITISH ROAD TAR EXHIBIT.

National Gas Council Display.

[*See Illustration on p.* 465.]

"British Tar for British Roads" would seem to be the slogan of the road tar producers who have organized a display at Wembley. The initiative has been taken by the National Gas Council, who acquired 1500 ft. of space in the Chemical Section of the Palace of Industry for an exhibit which will constitute the starting-point of a campaign designed to extend still further the use of tar in road construction and road maintenance. It is confidently anticipated that all the tar producers in the country will co-operate in pressing forward the good work which the National Gas Council have thus inaugurated.

The exhibit, which has been designed by the well-known artist, Mr. Norman Wilkinson, shows a wayside inn, which has been very appropriately named "The Jolly Jack Tar," with a tar-macadam road circumscribing it in front, passing over a bridge, and going off into the background. It is altogether a delightful little scene, which will receive its meed of praise from every passer-by. The artist has admirably fallen into line with the whole scheme of an exhibition in which, as is officially pointed out, "working models and scenic effects take, in large measure, the place of stacks of raw materials." In "Canada," "Australia," and "New Zealand" there are jewels of this kind which will long remain in the mind's eye; and "The Jolly Jack Tar" will have a place among them.

The Council propose to invite surveyors, chairmen of highways committees, road constructors, and others interested, to visit the stand, and to discuss with the expert in attendance any problems of a technical nature which confront them.

It is felt that in the past the economic and practical uses of British coal tar have not received the attention they deserve; and recognizing this, it has been decided by the producers to go carefully into the question from every aspect. It is intended to conduct a thorough investigation into every phase of construction work wherein coal tar enters.

Association of Statutory Inspectors of Gas Meters.—The annual general meeting of the Association (whose President is Mr. H. N. Barrow, J.P., the Chairman of the Manchester Justices' Gas Meter Testing Committee) will be held in the new County Hall, Westminster, on Wednesday morning, June 10, when the report of the Council will be considered and the general business transacted. By permission of the London County Council, and with the assistance of the Vice-President (Mr. J. Ollis), the afternoon will be devoted to a visit to the Finsbury gas meter testing office. Members will assemble at the office in Helmet Row, Finsbury, at 2.30.

WOODALL-DUCKHAM MODELS.

A Good Display in the Chemical Hall.

Among a number of models in the Scientific Section of the Chemical Hall, in the Palace of Industry, is an interesting collection loaned by the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., to illustrate modern means that have been adopted for treating coal and some of its products.

There is an extraordinarily complete and up-to-date model of a Woodall-Duckham vertical retort installation. This shows the latest silica construction, with two-stage heating, largely by which means the Woodall-Duckham Companies have been able to increase the thermal yield per retort by approximately 50 p.ct.

There is also a model of the most recent intermittent vertical chamber system. This model, as well as that of the chamber oven, is of quite a novel type. Every detail of operation, mechanism, and machinery is indicated; and nothing could be better than this method of presentation, on a small scale, of the system.

The model of the inclined chamber oven, another system which is also handled by the Woodall-Duckham Companies, is similar in conception to the intermittent vertical chamber model. These chamber ovens are particularly applicable to large works, where dense, blocky coke is desired, and where difficult coals only are available. In fact, the chamber oven may be taken as a substitute for large-scale horizontal practice, in that labour costs are materially reduced as compared with horizontals.

Another model of great interest is that of the "T.I.C." (lead bath) complete tar distillation plant. This is to scale; and the "attendant" in charge of the plant is also to scale. The model is complete with stills, condensers, heat interchangers, furnaces, receiving bunkers, pitch bays, railway tracks, and receiving trucks.

A brickwork model shows various sections of the latest type of Becker oven, and the cross-over flues which enable the coke ovens to be built longer and higher than was previously possible. In these ovens blast furnace coke, domestic coke, or free-burning smokeless fuel can be made at will. The throughput of coal per day may be as high as 25 tons per oven.

The Carpenter centrifuge—an apparatus for drying wet coals—is exhibited in model form. The most recent plant installed in this country is reducing the moisture to 5 p.ct., has a capacity of 50 tons of coal per day, and a power consumption of less than 1 H.P. per ton of coal treated. We understand that there is a big demand on the part of the collieries for these driers.

There are a number of excellent coke sections prepared by the research branch of the Woodall-Duckham Companies, to illustrate the structure of solid smokeless fuels made in different ways. Each of the models shown by the Companies is accompanied by one or more large framed photographs of the models, on which are indicated the names of the different parts of the plants. These photographs will prove of great value to the uninitiated.

Further, the Woodall-Duckham Companies have loaned to the Chemical Section forty mounted photographs, which form a sort of picture gallery illustrating the complexity and ramifications of the gas industry. These photographs are representative of the industry in all parts of the country.

There is no hesitation in saying that a close examination of this collection of models will repay those interested in carbonization.

Gas for Wicker Furniture Making.

The claim is advanced in the columns of the "American Gas Journal" that gas-fired boilers have done more to make reed and wicker furniture popular than any other one thing. Gas heats the water in which the dowels, or round pieces of rattan, ash, birch, or other wood are soaked to make them flexible. The reed pieces are then gone over with a gas torch, which singes off the fuzz; and the next operation is to place them in high-pressure steaming ovens, gas heated, where the dowels are rendered so flexible that they can be twisted and wound in any shape desired. The use of gas not only increases the speed of production, but reduces breakage to a minimum, and entirely eliminates cracking or warping in the finished product, as the high steam pressure forces the moisture on the outside of the dowels into the cells of the wood, and thus renders it extremely flexible. Wicker furniture manufacturers say that the introduction of gas fuel in the singeing and steaming operations has enabled them to keep pace with an enormous public demand for their product.

Preparing a Tender.—The Society of Engineers have published in pamphlet form (price 3s., post free) a paper entitled "Notes on Preparing a Tender," by R. I. Money, M.Inst.C.E. This lengthy paper contains some valuable data, and will prove very useful to engineers.

GAS AND THE HOUSING PROBLEM.

THE PALACE OF HOUSING AND TRANSPORT.

Reference was made by the King, in his speech at the opening, to the fact that this year one of the great halls—it is the one which last year constituted the Palace of Engineering—has been devoted to exhibits illustrating those problems of housing and transport which call so urgently for solution. It will be found that the principal section of what has thus now become the Palace of Housing and Transport is devoted to a collection of model houses, built with all the latest improvements known to science. Set out in tempting array, with gardens containing flowers and shrubs, are houses of timber, houses of brick, houses of steel, houses of timber and steel, houses of steel and concrete, and houses of concrete alone.

For this Housing Section, it is safe to prophesy great and lasting popularity. It deals with a problem that is in the minds of all at the present juncture; and it deals with it in a manner that must be productive of good. It shows that houses which are a pleasure to the eye so far as the exterior is concerned, and comfortable in the interior beyond all possibility of comparison with many of the old-style houses of similar size and class, can be provided without difficulty from the material point of view, if other obstacles are removed. There is plenty of room in the Palace for the various buildings to be seen in proper perspective, which is, of course, a highly important consideration in connection with exhibits of this character. However, of the general lay-out of this part of the exhibition it is impossible to say more here. Our special interest in the section at the moment centres on the displays mentioned below.

"CENTURY" HOUSES.

Occupying a prominent position in the Palace of Housing will be found a pair of "Century" houses, of the shingled type, constructed by Messrs. Henry Boot & Sons (London), Ltd., of No. 12, Grosvenor Place, S.W. Scientifically planned and executed in substantial style, these houses are provided with a living room, scullery, bath room, lobby, and the usual conveniences, on the ground floor, and three bedrooms; and the British Commercial Gas Association have been instrumental in arranging an appropriate and highly effective installation of gas apparatus. The lighting points, by means of Bland Light Syndicate fittings, have been arranged so as to demonstrate good illumination combined with efficiency and strict economy. There are one-light pendants with silk shades, and the feature of this portion of the exhibit is the fact that the illumination is arranged to correspond with the natural lighting. The pendants are fitted 2 ft. 6 in. back from the windows in the bedrooms, as this position provides the best light for a woman making her toilet.

From the fuel consumption point of view, the houses are smokeless throughout. In the scullery, there is in one case a Messrs. R. & A. Main's "Maintop," and in the other a Radiation "New World Junior" cooker. The wash coppers are respectively by Messrs. Wilsons & Mathiesons and Messrs. John Wright & Co. In the bedrooms there are built-in gas fires, with cast-metal registers complete, supplied by the Davis Gas Stove Company, Messrs. Fletcher, Russell, & Co., the Parkinson Stove Company, and Messrs. John Wright & Co.

"Solignum" wood-preserving stain is used here.

"SOLIGNUM" HOUSE.

While speaking of "Solignum," mention should be made of a charming little house in the Palace, which is occupied by Messrs. Major & Co., the proprietors of this extensively used wood preservative, and in which they draw attention to its many advantages.

A GAS-FITTED BUNGALOW.

An attractive bungalow has been fitted out by Messrs. Hampton & Sons, Ltd., of Pall Mall East, London, S.W.; and in this there are demonstrated up-to-date methods of hot water supply and cooking. For the former there has been installed by Messrs. Thomas Potterton, of Cavendish Works, Balham, S.W., a "Victor" No. 931 complete apparatus, so arranged as to afford an example of hot water service throughout the bungalow—supplying the bath, sink, and hand basins, and operating in conjunction with a No. 1 "Domestikatum" boiler, airing coil in the linen cupboard, and nickel-plated towel dryer in the bathroom. The No. 1 "Domestikatum" boiler forms an excellent combination with the "Victor" gas boiler, for alternative use in suburban and country residences, where access to the fuel store is easily arranged.

The cooking equipment of the bungalow is represented by a "Chef" series stand model gas cooker, by Messrs. William Sugg & Co., of Ranelagh Works, Westminster, S.W., as an example of efficient apparatus for this purpose.

Mr. John Graham Stewart, of Dunblane, Chairman of Messrs. Stewarts and Lloyds, Ltd., tube manufacturers, who died in March, aged 63 years, left personal estate in England, Scotland, and abroad of the value of £396,753.

GENERAL EXHIBITS.

"W.-D.-C." GAS-FIRED BOILER BURNER EQUIPMENT.

An exhibit by Messrs. Burnard in the Palace of Industry consists of a complete milk sterilizing plant, and in connection therewith is a Woodall-Duckham-Cochran gas-fired boiler, fitted with the burner equipment of British Furnaces, Ltd., whose head office and works are in Derby Road, Chesterfield.

The Cochran boiler is of an ideal design for the purpose of incorporating the principles of surface combustion, and in the "W.-D.-C." gas-fired boiler these principles are applied. The usual grate for coal firing is replaced by a bed of broken refractory material, and into this bed is delivered a correctly proportioned mixture of gas and air. Combustion is instantaneous and complete, and the bed rapidly attains a state of incandescence.

The burner consists of a heavy casting set in brickwork, and so arranged that only a minimum of surface is exposed to, and can absorb heat from, the furnace. A sufficient cross section is provided to conduct back to the outside of the furnace the heat so absorbed. In this manner, the tip or nozzle is automatically kept uniformly cooled. The burner is supplied with a correctly proportioned, and thoroughly homogeneous, mixture of gas and air through a surface combustion proportioning inspirator. These inspirators automatically maintain constant and correct proportions of gas and air in the mixture fed to the burner, and they further make it possible to control the quantity of mixture by means of a single valve. Independent means are provided for setting the air-gas ratio.

The advantages claimed for the "W.-D.-C." gas-fired boiler are: Guaranteed high efficiency (up to 90 p.ct.); perfect and flameless combustion; automatic proportioning of gas and air; back-firing and explosions eliminated; no excess air in products of combustion; no brickwork setting required; no induced draught; dry steam; minimum floor space; radiant heating; and automatic control easily applied.

"IDEAL" DOMESTIC BOILERS.

In the Housing Section a good show is made of "Ideal" domestic boilers, which, it is pointed out by the makers—the National Radiator Company, Ltd., of Hull, and Nos. 439 and 441, Oxford Street, London, W.—are simple in design, yet highly efficient; 50 gallons of hot water being obtained with 9 lbs. of coke. They occupy little space when installed, and are easily connected to existing pipes, as auxiliary to, or independently of, the kitchen range boiler; and they are, of course, of great use accompanying gas cookers. Both closed and open-fire patterns are manufactured, so as to meet all requirements. The "Ideal Classic" boiler is designed for central heating systems, and enables from three to ten rooms to be warmed from a single fire, at the same time providing abundant hot water for baths and domestic use.

ASBESTOS FOR ENGINEERS.

Bell's United Asbestos Company, Ltd., who are represented in the Palace of Transport, were the first to engage in the European asbestos trade, having been established in the year 1871. All asbestos goods sold by the Company are made at their own works; and the Company are therefore able to secure for their products a uniform standard of excellence.

"MONOMETER" SPECIALITIES.

Again this year there are to be seen examples of the specialities of the Monometer Manufacturing Company, Ltd. In the Palace of Transport attention is drawn to their white metal furnace for use with gas, as well as to their patent low-pressure gas die-casting machine. Those connected with the printing and allied trades who go to Wembley will doubtless take the opportunity of inspecting this exhibit, which is likely also to receive the consideration of gas men. To the white metal user the appliances present various features which deserve to be taken into account; while the gas man will regard them as useful media for securing an addition to the highly desirable "industrial load."

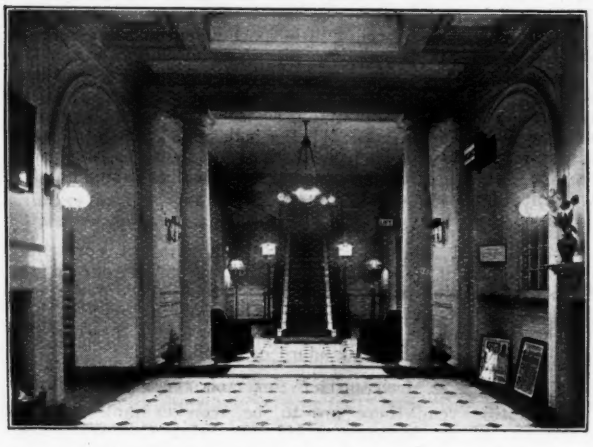
Pasteurizing Milk by Gas.—If you cannot obtain pasteurized milk, and if you are doubtful about the purity of the raw milk, you may pasteurize it at home on the gas cooker hotplate by the following easy methods set out in the "American Gas Journal": Take a pail deep enough to allow water placed in it to reach the neck of a quart milk bottle. Place an inverted saucer in the bottom of the pail, and set the bottle of milk on the saucer. Pour water into the pail up to the top level of the milk in the bottle. Put the pail containing the bottle and the water on the hotplate, and leave it there until the water boils. Then turn off the gas, remove the pail, and let it stand, covered, for half-an-hour. Remove the bottle of milk, and cool it quickly by letting cold water run over it. Boiling the milk for three minutes will also make it safe for infant feeding.

NEW GAS SHOWROOMS AT HULL.

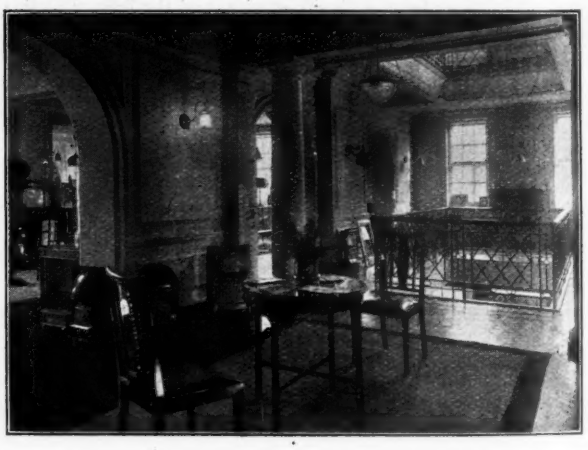
Enterprise of the British Gas Light Company, Ltd.

The new showrooms of the British Gas Light Company at Hull are generally admitted to be, for beauty and completeness, in the very front rank of such contributors to the service of gas undertakings. Attestation to this is given by the series of photographs which we are enabled to publish this week through the courtesy of the Company's Engineer and Manager at Hull (Mr. Harold E. Copp).

The showrooms occupy an important corner site in the centre of the city, and have a window frontage of approximately 180 ft. There are two entrances, one in Story Street and one in Prospect Street. The main entrance hall is in Story Street, and is 45 ft. long by 15 ft. wide. On the right, as one enters, is the Showroom Manager's office, the accounts and cash sales office, and the service and complaints office, while beyond this is a model room, the idea of which is to display suitable gas apparatus for heating and lighting to suit the particular furnishings shown. To the left is seen the ground-floor showroom, the salesmen's desk (where all sales, &c., are recorded), and the seating accommodation provided for consumers. Here also is

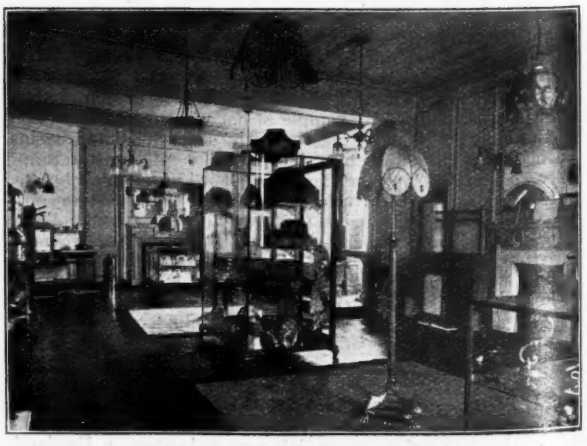


Entrance Hall.



A Corner of the First Floor.

Combined Showroom and Rest Room.



Another Showroom with Bathroom Annexe.

shown a coke fire in operation, constructed on Prof. Boys' principle, and lighted by a gas poker burner. This has attracted considerable attention, and has stimulated the sale of coke for household use.

The display of lighting fittings on the ground-floor is also an attractive feature. The showrooms on the first-floor are beautifully arranged, and are interconnected by archways.

A pneumatic tube has been installed, connecting the cashier's office on the ground-floor with the general offices in Baker Street, situated about 380 yards distant. Cash and receipts are passed directly through the tube between these points, and the carrier only occupies about 18 seconds in transit. One of the illustrations shows the room at the top of the staircase. This is a showroom and rest-room combined, being tastefully arranged, light, and airy. The centre-well provides adequate ventilation and light.

Another photograph portrays a showroom in which are a model bath, a gas-heated towel rail, a geyser, and a "B.T.U." circulator, together with glass show-cases containing silk shades, gas brackets, and glassware. Here also are shown gas fires in suitable fireplaces, "Eye-Level" cooking ranges, &c.

A portion of the gasfittings display room and the costing office counter are depicted in a further illustration. The beauty of the arches and architectural work generally will be noted in the various photographs.

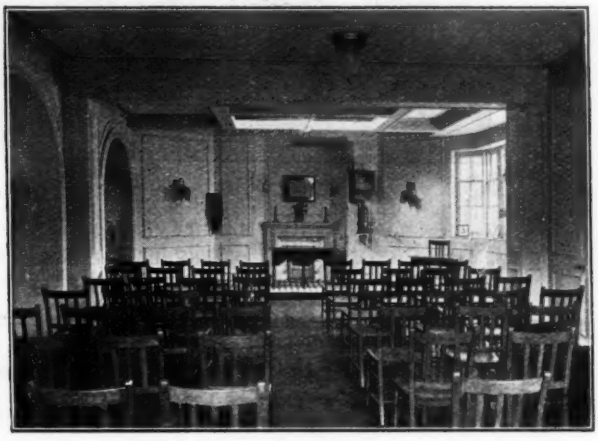
On the top floor a lecture room has been provided which will seat about 120 people, and cookery lectures are already proving themselves a great source of attraction and interest. Stock rooms and a test room have also been fitted on this floor. All floors are reached by a lift.

The Architect for the work is Mr. P. Morley Horder, F.R.I.B.A., of London.

In the handsome new building, cookery lectures and demonstrations have been revived; and the opening lecture was delivered by Mrs. Dunn on April 20. On the occasion, Mr. Copp stated that the primary object of the lectures was service to the community. The British Gas Light Company, Ltd., he said, instilled into the minds of their officials the idea that they were the servants of the public, with obligations and responsibilities to their consumers. In London, Paris, and New York—especially in the last-named city—there was an enormous increase in gas consumption for domestic purposes. One could not help feeling that in this country cookery had been neglected; and it was with the idea of securing an improvement in this direction that the lectures were being revived.

Mrs. Dunn, who has been on the staff of the British Gas Light Company for many years, is an interesting demonstrator, and there are no dull text-book references in her lectures. Her audiences (on the occasion of the first lecture, as on others) made profitable use of notebooks and pencils, and were in general agreement that a simple recipe and an ordinary gas cooker could in combination achieve delectable results in pastry making. The lectures occupy about one hour, and are held in the afternoons.

Gasfittings Display Room.



Lecture Room.

HOUSE HEATING.*

It is a truism that only the one who knows a great deal about a subject can write about it in a simple and convincing manner; and it is a wise precaution in these day , when truth is too often relegated to the back of the stage, while dramatic effect prances and pirouettes in front of the footlights, to be suspicious of "cleverness." Readers of "House Heating," however, have no need to be suspicious of this book. It is certainly the best treatise on the relative merits of coal, coke, gas, and electricity as alternative means of providing for domestic heating, cooking, and hot water requirements which we have yet encountered. The author, Dr. Margaret Fishenden, who is at present engaged upon investigations into problems of domestic heating for the Department of Scientific and Industrial Research, is well known to many readers of the "JOURNAL," on account of the valuable work which she has already accomplished; and the gas industry will be indebted to her for publishing a well-balanced book containing information on which full reliance can be placed.

The first chapter deals generally with fuels, and mention is made of the vast amount of raw coal which is still burned in our domestic grates. After reading this chapter one is impressed with the need for paying greater attention to the production of a high-temperature coke to replace much of this coal. Dr. Fishenden says that, as a domestic fuel, gas coke in this country has met with only a restricted measure of acceptance. This is due partly to its low volatile content, and partly to the amount of water which it frequently contains. Also, the "'sulphurous' smell often associated with coke fires burning below flues where the draught leaves something to be desired is another cause which has militated against its more general employment for household purposes, and which has led to the erroneous idea that coke contains more sulphur than coal."

Recent investigation into the problem of combustibility of coke—and we would refer particularly to the work of Sutcliffe and Evans—has proved that the structure of a coke has a large bearing on its combustibility, and is, indeed, the greatest influence. In view of this there seems to be a wide and almost unexplored field for the use of high-temperature coke for domestic purposes; and in thinking of this we are reminded of the stress laid by Sydney North and J. B. Garbe, in their recently published book, "Low Temperature Distillation," on the need for keeping in the forefront of low-temperature carbonization the object of producing the largest quantity of oil, and regarding the residual fuel as a secondary consideration. No doubt the Coke Competition—full details of which have appeared in the "JOURNAL"—will add to our knowledge of gas coke, and demonstrate the modifications whereby the gas industry may produce a coke suitable in all respects for domestic requirements.

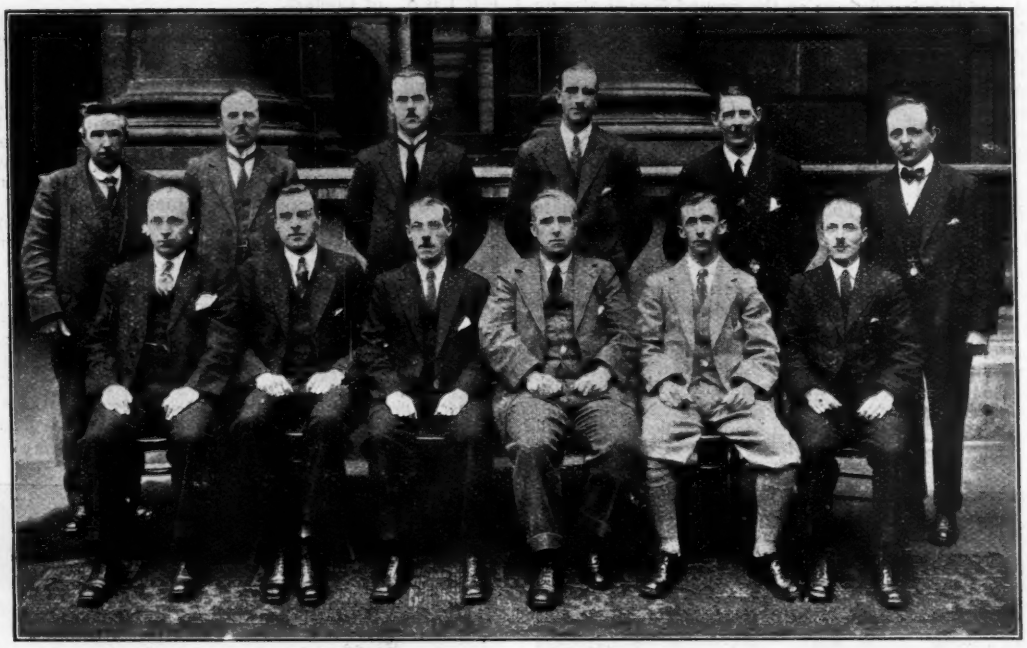
Speaking of electricity as a heating agent, the author states that the low efficiency of its generation militates against its general adoption for this purpose. In the United Kingdom, an overwhelming proportion of the total electricity supply is yielded from the burning of coal; and in spite of the Final Report (1921) of the Water Power Resources Committee, Dr. Fishenden remarks that it is "very unlikely that the near future will see any considerable proportion of this potential power (water) harnessed, and for heat production electricity will probably remain relatively costly."

The development of the modern sitting-room grate and of the kitchen range, the use of gas and electricity for heating and cooking, and the development of central heating—these subjects are dealt with thoroughly. It would be an easy matter to write at length on the many points raised by reading "House Heating," for it is a book which encourages thought. Sufficient has been said, however, to indicate the value of the work; and Dr. Fishenden and Messrs. H. F. & G. Witherby are to be congratulated on the writing and production of a volume which has created a new standard in the literature of a subject of first-rate importance alike to the nation and the individual.

*"House Heating," by Margaret Fishenden, D.Sc., F.Inst.P. Published by H. F. & G. Witherby. Price 25s. net.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)



MEMBERS OF COUNCIL, 1924-25.

BACK ROW (Left to Right): J. M'INTYRE (Glasgow); W. HOGG (Glasgow); A. SHAND (Falkirk); J. HALL (Provan); J. BROWN (Glasgow); J. TEAPE (Glasgow).
FRONT ROW: J. MURRAY, Hon. Secretary (Glasgow); ROBERT GRAY, Vice-President (Hamilton); J. M'ISAAC, President (Glasgow); A. WALKER (Kilbarchan); and A. T. SINCLAIR (Greenock).

NATIONAL GAS COUNCIL.

SCOTTISH DISTRICT.

The Annual Meeting was held in the North British Station Hotel, Glasgow, on May 5—Councillor JAMES STEWART, Convener of the Edinburgh Gas Department, in the Chair.

ANNUAL REPORT.

Gas Regulation Act, 1920.—At the annual meeting in May, 1923, the proposal that municipalities in Scotland owning gas-works be advised to take early steps to adopt the Act, and apply the therm system of charge as from the commencement of the next financial year—namely, May 15, 1924, was unanimously agreed to. At this date 37 undertakings—municipal 33, statutory companies 4—have adopted the Act. The undertakings, with their declared values, are as follows:

Undertaking.	Present Declared Calorific Value.	Undertaking.	Present Declared Calorific Value.
	B.Th.U.		B.Th.U.
Municipal:		Municipal:	
Aberdeen	—	Holytown	400
Airdrie	425	Inverness	500
Alloa	440	Johnstone	420
Arbroath	450	Kirkintilloch	450
Bellshill	400	Lanark	470
Bridge of Allan	500	Larkhall	400
Cambuslang	400	Motherwell	400
Denny	550	Paisley	500
Dumbarton	425	Peebles	520
Dumfries	500	Perth	450
Dundee	450	Renfrew	450
Dunfermline	430	Troon	450
Dunoon	450	Uddingston	400
Edinburgh	500	Wishaw	400
Falkirk	430	Company:	
Glasgow	470	Busby	500
Grangemouth	500	Coatbridge	475
Greenock	410	Musselburgh	450
Hamilton	440	Stirling	475

It is learned that the experience of undertakings working under the Act has been satisfactory, and that there is not the slightest desire to revert to the old order of practice. The therm method has been favourably accepted by the public.

A deputation representing municipalities and other local authorities in England recently approached the Board of Trade suggesting that the adoption of the Act should be left to the voluntary action of the municipalities and authorities concerned. Mr. Ashley, Principal Assistant Secretary, Industries and Manufactures, Board of Trade, stated that "after two years from the passing of the Act the Board of Trade were empowered (under section 1 (5)) to make compulsory Orders; it obviously being the intention of Parliament that the new basis should ultimately be adopted throughout the whole of the gas industry. To the local authorities who had not yet applied for an Order the Board of Trade had given 2½ years' grace; but the time had come when it was necessary for the Board to decide what they were going to do to carry out what was clearly the intention of Parliament." The impression with which the deputation came away was that the Board of Trade would, sooner or later, compel every gas undertaking to come under the Act at an opportune moment for the undertaking.

The municipalities in Scotland who have not yet made application for an Order are as follows: Alva, Ardrossan, Bervie, Buckhaven and Leven, Burntisland, Campbeltown, Carnoustie, Darvel, Doune, Dunbar, Elgin, Forfar, Fraserburgh, Gourock, Helensburgh, Kilmarnock, Kilsyth, Kirkcaldy, Kirkcudbright, Kirkwall, Largs, Lockerbie, Millport, Monifieth, Newmilns, Newport, North Berwick, Peterhead, Port Glasgow, Sanquhar, Tain, and Tayport.

As regards the position of municipalities in Scotland, the Board of Trade desired to meet representatives. Accordingly a small deputation—Mr. James Campbell, of Dunfermline, President of the North British Association of Gas Managers, and Mr. J. W. Napier, of Alloa, along with Mr. Fottrell, of the National Gas Council—were received by Mr. Ashley and Mr. Honey on April 6. The discussion centred round the position of the very small undertakings. It was pointed out that, in addition to the expense of providing the necessary apparatus, with accommodation, and fees for gas examiners, there were incidental and practical difficulties in the cases of gas-works having a small annual output, and where there was no real staff. Also it did not appear that the small number of consumers concerned would be detrimentally affected, or that the coal carbonized—taking all the small undertakings together—was of substantial quantity, or that the small gas-works were in a financial position to introduce modern carbonizing plant with economy of coal. Mr. Ashley and Mr. Honey were satisfied with the evidence placed before them, and readily agreed that the position of the small gas-works required special consideration as regards the adoption of the Act. Mr. Ashley indicated to the deputation that the Board might agree that no steps be taken in compelling the adoption of the Act in the case of gas-works having an output of 25 millions and under, but that consideration would require to be given to the subject

Scheme for Sale of Tar and Ammoniacal Liquor to Distillers.—The scheme continues in successful operation. The monthly awards of values by the Arbiter are as follows:

		Tar. Per 100 Gallons	Liquor (4° Tw.). Per 100 Gallons.
		s. d.	s. d.
1924.	May	28 11½	3 0·625
	June	26 10½	2 9·375
	July	25 6½	2 9·375
	August	23 7½	2 9·375
	September	20 6½	2 7·75
	October	19 4½	2 7·75
	November	19 4½	2 7·75
	December	19 4½	2 7·75
1925.	January	19 11½	2 7·75
	February	21 3½	2 7·75
	March	21 11½	2 7·75

NOTE.—**The above rates are at distillers' works, but railway dues from gas-works to distillers' works are paid by the gas undertaking.**

Parish Council Assessment.—As the result of the statement of information sent to members, a number of gas undertakings have succeeded in obtaining an increased percentage deduction granted under section 37 of the Poor Law Act, 1845.

Government Legislation and Subsidies for the Development of Electricity.—Full information upon this subject has been sent to members, and the hope is expressed that practical attention will be given to the matter by Committees and Boards of Directors. The subject involves important questions of policy. The suggested subsidies in favour of electricity are calculated to injure materially the interests of the gas industry in general. Those responsible for the administration of individual undertakings are expected to take action in the manner suggested by the Central Executive Board in the special booklet and circular letter issued.

Mr. S. S. Ogilvie (National Gas Council) explained the action proposed to be taken in connection with the suggested Government Legislation for the development of electricity. Mr. W. E. Whyte (Lanarkshire) referred to the same question, and suggested that it would be most desirable if local authorities in Scotland were to have a conference on the subject, with a view to taking steps to safeguard the interests of gas undertakings. Mr. Whyte's suggestion was unanimously agreed to, and an early meeting will be arranged for.

British Empire Exhibition, 1925—Gas Exhibit.—The sum contributed by gas undertakings in Scotland for the 1924 exhibit was about £5000. The Committee heartily commend the attention of Committees and Directors to support the scheme, which includes, besides the actual exhibit, a wide publicity campaign in the Press. Undertakings are asked to subscribe one-half of the amount they contributed to the 1924 exhibit, or 3s. per million c.ft. of gas made.

Membership.—The number of Scottish undertakings in the membership of the National Gas Council is as follows: Companies 66 (last year 66), corporation 44 (last year 44).

The following appointments were made for 1925-26:

MANAGEMENT COMMITTEE.

Chairman.—Councillor James Stewart (Edinburgh).
Vice-Chairman.—Bailie Slorach (Hamilton).
Secretary.—Mr. J. W. Napier (Alloa).

The following twelve members: Messrs. George Braidwood (Coatbridge), James Campbell (Dunfermline), James Dickson (Dundee), T. W. Harper (Ayr), L. Hislop (Cowdenbeath), Bailie Hunter (Perth), John Lang (Alexandria), George Keillor (Greenock), Samuel Milne (Aberdeen), J. W. M'Lusky (Glasgow), John M. Smith (Stirling), and W. E. Whyte (Lanarkshire).

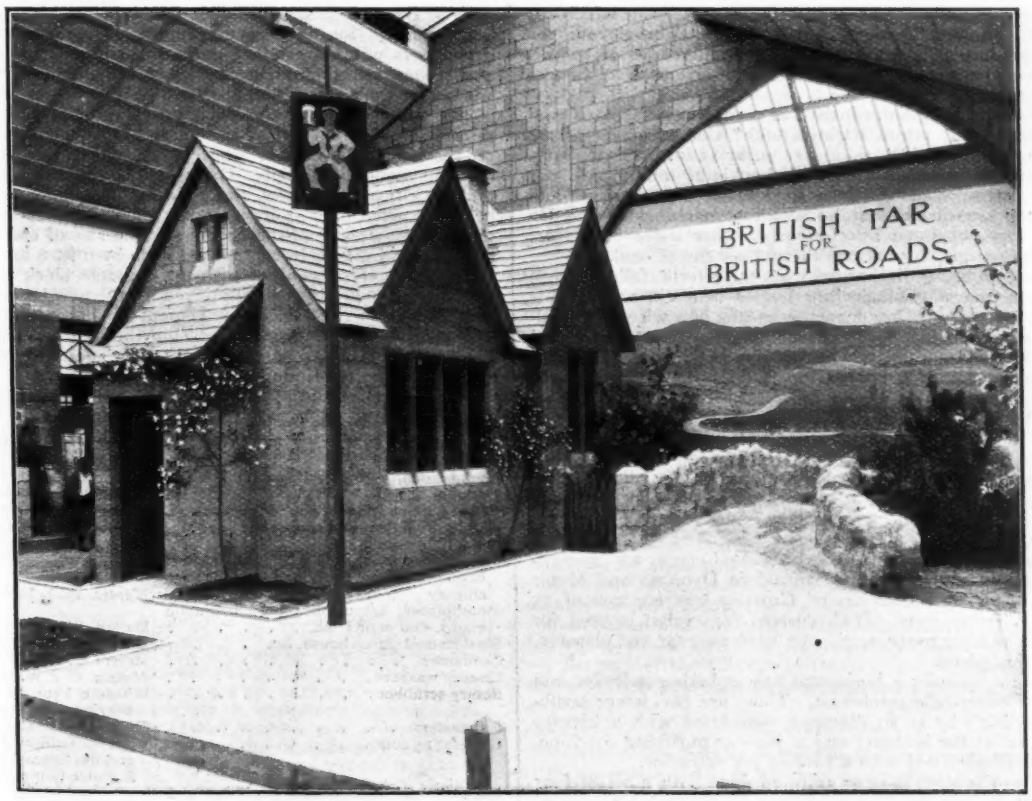
Representatives on the Central Executive Board, with year of retiral.—Bailie Slorach (1926), Mr. J. W. Napier (1927), Mr. L. Hislop (1928), and Councillor James Stewart (1929).

Memorial to the late Lord Moulton.—A scheme has been adopted by the friends and admirers of the late Lord Moulton for the erection of a permanent memorial to his great achievements in the legal and scientific spheres, and, in particular, his invaluable services to his country in the war. The scheme comprises the conversion of the main schoolroom of the Kingswood School, Bath, into a Lord Moulton Memorial Hall.

The "Electrician" Annual Tables of Electricity Undertakings.—Messrs. Benn Brothers, Ltd., 8, Bouverie Street, E.C. 4, have published the Annual Tables of Electricity Undertakings for 1925. The Tables have been thoroughly revised, and further useful details have been added. Particulars of over a hundred additional undertakings in Great Britain, Europe, and the Colonies and countries abroad appear, while complete lists of the smaller concerns in Yugo-Slavia and Roumania are given for the first time. Altogether over 2000 undertakings are dealt with, and the new edition has been expanded by twenty pages. The price of the work is 10s. net, postage 6d. extra.

ROAD TAR EXHIBIT

OF THE NATIONAL GAS COUNCIL AT WEMBLEY.



[*Photo. Campbell-Gray.*

(*For description, see p.* 460.)

MIDLAND ASSOCIATION AT OXFORD.

In concluding his Presidential Address to the Midland Association of Gas Engineers and Managers in March, Mr. W. E. Caton, A.M.I.Mech.E., the General Manager and Engineer of the Oxford Gas Light and Coke Company, extended an invitation, on behalf of his Directors, to the members to visit their beautiful city for the summer meeting. Thus Thursday, May 7 (the date fixed), was a day which will long be remembered with pleasure by a large number of members and friends.

AT THE GAS-WORKS.

The morning was spent at the gas-works, where the visitors were welcomed by the Chairman of the Company (Alderman F. W. Ansell, J.P.), the Vice-Chairman (Mr. Walter Turrill), Alderman Dr. G. Claridge Druce, and Mr. R. C. Downing (Directors), and Mr. Caton, who, with Mr. H. A. Coombs (Assistant Engineer and Works Superintendent) and Mr. S. Colebourne (Chemist) showed them round. In his address, Mr. Caton had prepared the members for seeing a good deal of work in progress, but the extent of it proved a surprise to many of them. The reason for the entirely new unit, from retort house to meter house, which is being put down, is to be found in the fact that, when Mr. Caton was appointed General Manager and Engineer in 1916, the consumption amounted to only 400 million c.ft. By 1918 it had increased to 433 millions; and since then the growth has been still more rapid—the figure for 1924 reaching 723 million c.ft. Naturally, this rapid increase in output, due mainly to cooking and heating, severely tried the productive capacity of the existing works; and so a completely new works was decided on, to be erected on a site adjacent to the old site, to be used as an additional manufacturing station—not in substitution for the present one. It may be mentioned here that prior to the war the price of gas was 2s. 6d. per 1000 c.ft. to ordinary consumers within the city, and 3s. outside; while since July 1, 1923, the charge has been 8⅝d. per therm in the city, and 9⅝d. outside—or 3s. 2·64d. and 3s. 8·16d. per 1000 c.ft. respectively.

The works are located on the south-west side of the city, and occupy an area of 20 acres. They are situated on both banks of the River Thames, which divides the new manufacturing station in course of erection from the present works. The Company have two sidings from the Great Western Railway into the works. The one serving the present works passes over the River Thames, and is carried by a girder bridge, the property of the Gas Company, and thence by a viaduct into the retort house; that serving the new works goes direct into the works.

Existing Works.

Coal trucks are shunted by the Company's own locomotive along elevated sidings, on both sides of the retort house, where they are unloaded by hand into hoppers, from which the coal is fed into the breakers and elevators. The elevator on the discharging side delivers on to a band conveyor, which takes the coal across the retort bench into an overhead hopper on the charging side.

The carbonizing plant consists of two benches of ten and thirteen horizontal retort settings with Klönne regenerators; each bed containing eight retorts 21 in. by 15 in. by 20 ft. long. The safe working capacity of this plant is 2½ million c.ft. per day, with best selected coal or washed nuts. The charging and discharging are carried out by separate machines of the De Brouwer type, operated by electricity. For three years Mr. Caton has been getting over 70 therms per ton of coal.

The coke, on being discharged from the retorts, falls through openings in the stage floor into bogies beneath, where it is quenched. The bogies are drawn by means of a wire-rope haulage system up an inclined track outside the retort house and along an elevated gantry, where the coke is tipped on the main storage heap or into a hopper for feeding the coke elevator. The haulage system is driven by a 25 H.P. motor, which is operated by a series of push-button controls fitted at intervals alongside the track. The hopper fed by the coke-haulage system discharges into an elevator, which can be used either for loading direct into railway wagons or for discharging through a breaker and rotary screen, where the coke is graded and falls into bins. The whole plant is driven by one 11 H.P. electric motor.

The power house contains two 15 KW. and one 25 KW. generators, all manufactured by the Lancashire Dynamo and Motor Company, Ltd., direct driven by Crossley gas engines of 25 and 40 H.P. respectively. D.C. current (220 volts) is used for driving the stoking machinery, coke haulage gear and elevator, and screening plant.

Other plant includes a horizontal atmospheric condenser and a Clapham water-tube condenser. There are two tower scrubbers, 60 ft. high by 10 ft. diameter—one fitted with a Livesey tar extractor at the bottom; and a Walker purifying machine, which is similarly fitted with a Livesey tar extractor.

The dry purification is practically all done with a set of four purifiers, 40 ft. by 30 ft. by 5 ft. deep, with water lutes, erected by Messrs. C. & W. Walker. There is a second set of three purifiers, 25 ft. by 25 ft. by 5 ft., with water lutes, which can be worked in parallel with the main set; but, owing to difficulty in handling, these have not been worked for some years. There are also two luteless catch boxes, 40 ft. by 40 ft. by 6 ft. deep, by Messrs. C. & W. Walker.

The Parkinson station meter is of a capacity of 150,000 c.ft. per hour. There are three gasholders (besides the water gas relief holder); the capacities being ½ million, 1 million, and 2 million c.ft. respectively. The last-mentioned was recently constructed by Messrs. C. & W. Walker, and brought into commission in September last. Three 18-in. Parkinson station governors supply separate districts, but the districts are ultimately connected up.

There is one carburetted and one blue water gas plant, of Messrs. Davison & Partner's manufacture; the nominal capacities being 600,000 and 500,000 c.ft. per day respectively. There are a water-tube condenser and two scrubbers common to both sets. The unpurified water gas is sent into a relief holder having a capacity of 300,000 c.ft.; and from the holder it is drawn as required into the coal gas mains at the inlet to the exhausters after first passing through a rotary meter.

The ashes from the retort house and the water gas plant are taken to a Type B. 1 "Columbus" separator, which produces coke 43 p.ct., clinker 25 p.ct., and fine ashes 32 p.ct.

Works Under Construction.

The site of the new works is subject to flood, and consequently the ground level is to be raised about 4 ft. The new retort house will be a steel-framed building filled in with concrete block work. The first bench of retorts will consist of eight beds of Klönne settings of 8 section retorts 24 in. by 17 in. by 22 ft. long. The lay-out of the works is arranged so that the house can be extended for two more similar benches.

The coal trucks will be emptied by means of a rotary tippler into a hopper outside the retort house, where the coal will be broken and elevated into the retort house. There it will be discharged on to a push-plate conveyor running over continuous coal hoppers, a 30-ton hopper being erected opposite each bed. The stoking machinery will consist of a De Brouwer charging machine and separate discharging machine on one side, with an additional discharging machine on the opposite side of the house. The latter machine is for feeding the producers, which are placed on the charging side. The object of this is to keep the furnaces on the opposite side to the coke handling plant, which will be on the same system as in the old works. The coke will be discharged through openings in the stage floor into trucks, where it will be quenched, thence running out of the retort house to an elevated gantry—the trucks being operated by an electric rope haulage system.

Water-tube condensers only will be employed. Two sets of exhausters will be installed, each set consisting of a horizontal steam engine coupled to an 80,000 c.ft. per hour exhauster, with provision for fixing a 100,000 c.ft. per hour exhauster on to each engine. Two Lancashire boilers, 30 ft. by 8 ft. 6 in. diameter, will be fixed at first, the boiler house being large enough to accommodate four boilers eventually. Two 100 KW. steam-driven sets will be installed, each consisting of a vertical compound steam engine direct coupled to a dynamo. One Livesey washer and one rotary scrubber will be provided to begin with.

The first section of the purifying plant will consist of five purifiers 35 ft. by 30 ft. by 6 ft. deep. These will be arranged on the ground level in a single row, with a revivifying shed running along either side. Owing to the proximity of the river and the city water-works, the main tar and liquor tanks are to be constructed of cast iron, and erected above the revivifying floors at either side of the purifiers. The size of each tank will be 166 ft. 6 in. long by 26 ft. 6 in. wide by 6 ft. 6 in. deep.

Special interest was taken in the concrete block making installation; the product being utilized for the new buildings. The composition of these blocks is cement 1, sand 2, and ashes 2; four men being engaged in preparing the material and making the blocks, a large proportion of which are moulded in a Winget machine. The total number made daily is about 250.

The makers of the plant erected and ordered up to the present time are:

Concrete blocks	Oxford Gas Light and Coke Company.
Foundations, retort settings, and block-work	Messrs. Thos. Vale & Sons.
Railway weighbridge	Messrs. H. Pooley & Sons.
Tippler, elevator, and conveyor	West's Gas Improvement Company.
Steel-framed retort house, buckstays, steel hoppers, stage floor, and stoking machinery	Messrs. W. J. Jenkins & Co.
Mouthpieces, ascension pipes, hydraulic mains, foul mains, &c.	Messrs. Westwood & Wrights.
Steel-framed pump house, &c.	Messrs. Westwood & Wrights.
Condenser	Messrs. C. & W. Walker.
Livesey washer	Messrs. C. & W. Walker.
Rotary scrubber	Whessoe Foundry and Engineering Company.
Exhausters	Bryan Donkin Company.
Generating sets	Messrs. Belliss & Morcom and the Lancashire Dynamo & Motor Company.
Purifiers and connections, purifying and revivifying houses, with overhead tar and liquor tanks	Messrs. C. & W. Walker.
Station meter and retort house governor	Messrs. W. Parkinson & Co.

There is a block of offices at the existing works, comprising the Engineer and General Manager's Office, Assistant Engineer and District Superintendent's Office, Works Office, and the Slot Meter Department Offices.

GENERAL.

Excellent showrooms, opposite Christ Church College, were opened in February, 1921, and have proved a very great acquisition to the Company. All the gas lamps in the district of supply, numbering 1537, are of the inverted superheated cluster type, of Messrs. William Sugg & Co.'s manufacture; and each lamp is controlled by a Gunning clockwork controller. These controllers have been in operation since 1907. The declared calorific value of the gas is 460 B.Th.U., and that supplied averages 470 to 480 B.Th.U.

HOSPITALITY.

After the inspection, a party numbering about eighty sat down to luncheon in the Assembly Room at the Town Hall, by invitation of the Chairman and Directors of the Oxford Gas Company. Alderman Ansell was in the chair, and he was supported by the Mayor (Mr. Amos J. George), the Deputy Mayor, the Sheriff, and members of the Town Council and the University. There were also present Mr. J. Ferguson Bell (President of the Institution of Gas Engineers), Mr. W. H. Johns (President of the Wales and Monmouthshire District Institution of Gas Engineers and Managers), and Mr. H. C. Smith (Hon. Secretary of the Southern Association of Gas Engineers and Managers). After the honouring of the Loyal Toast,

Mr. HUBERT POOLEY submitted "The City of Oxford." He said he found that Oxford was first mentioned in history when King Edward the Elder recovered it from the Danes in 912; and right through those long centuries since then the city had been one of the chief centres of interest and enlightenment. Organized study, they were told, began in Oxford about three centuries later than the year he had just named. The oldest college endowment was that of University College, which dated from about 1249. One was reminded that such famous men as Bacon, Wycliffe, Wolsey, Tyndale, Raleigh, Blake, Pitt, and a host of others, were all connected with Oxford—not to forget Sir Thomas Bodley, whose name was borne by that wonderful library—one of the city's proudest possessions. He felt pretty sure that Oxford's most important industrial effort had been the University Press, which, as the Clarendon Press, was founded about 1672, and had flourished under the wing of the great University ever since. One was, perhaps, tempted to criticize the authorities of that age for allowing the art of printing to advance in Europe for a century-and-a-quarter before founding the press which was now world famous; but, if one had any such uncharitable thought, one was filled with admiration for the wisdom of all the generations of Oxford men, who had surrounded her students with the beauty of her public places. There was a remarkable calm and majesty about the city. "Time will only permit me," he went on, "to hint at the high hope we all have in Oxford, that the rising and future generations which pass through your hands may uphold the traditions you have already earned in that knowledge and understanding, integrity, and high honour for which the best Oxford-trained men have been renowned." So far as the Association were concerned, Oxford for many years meant to them Mr. Eldridge. The city was well served by him in the days that were past; and in their President he was sure the Company had already found a worthy successor.

The MAYOR said nothing could have done more to make his task of replying easy than the genial terms in which the toast had been proposed. The citizens had always felt that they had every reason to be proud of the history of Oxford. They welcomed the Association in the heartiest manner possible, and hoped they would carry away memories which they would long cherish.

Mr. J. FERGUSON BELL, proposing "The Oxford Gas Light and Coke Company," said they had that morning inspected the large extensions now in progress at the gas-works, which demonstrated the perspicacity of the Directors and the ability of their capable Engineer. Any engineering construction in Oxford had to satisfy some very critical eyes. It was one of the most beautiful of English cities, and any building, therefore, would be expected to reach a high level in appearance. But there was no reason at all why modern engineering construction should be ugly. He ventured to assert that the additions to the Oxford Gas-Works fully complied with the requirements, and when completed would be a credit to the city as well as worthy of a progressive Company. The Oxford Gas Company were very old established, having obtained their first Act of Parliament as far back as 1818. Like the many famous colleges for which the beauteous city was renowned, the reputation of the Company was not diminished by age, but continued to advance. The new works indicated the rapid progress in the use of town gas in the city. This was exactly what one would expect in a place like Oxford. The citizens must desire that every precaution be taken to preserve the gems of architectural beauty which not only adorned the city, but were of priceless value as a national asset. The use of raw coal for domestic and trade purposes should be discontinued, as it meant a smoky atmosphere, polluted with soot and sulphurous products, which were not only injurious to health but destructive to buildings. It was no wonder, then, that the citizens, who were so justly proud of their colleges, were using gaseous fuel in increasing quantities; and they happily possessed a progressive Company able and willing to provide this on most reasonable terms. The pre-war charge for gas in Oxford was 2s. 6d. per 1000 c.ft. within the city and 3s. without; and the price to-day was only 3s. 2½d. in the city, which, considering the geographical position of Oxford in respect of coal supplies, was an abnormally low figure, and indicated that the undertaking must be ably managed. They all knew the purchasing power of a sovereign was not more than 12s. to-day; so on this basis the post-war charge for gas in Oxford should be 3s. 2d. per 1000 c.ft., whereas it was only 3s. 2½d. The Directors and their very able Engineer and General Manager, Mr. Caton, were entitled to be proud of this low price; and he congratulated them—as well as the citizens of Oxford—upon being able to obtain town gas upon such satisfactory terms. He desired to express the members' appreciation of everything that had been done for them that day. ["Hear, hear."]

The CHAIRMAN replied that when an industry was served by gentlemen possessing the qualifications of those he saw around him, neither Directors nor shareholders would have any cause to complain. There was no fear of the powers given to gas companies by Act of Parliament being exercised otherwise than in the best interests of everybody.

Dr. CLARIDGE DRUCE proposed "The Midland Association of Gas Engineers and Managers," to whom, he said, a most cordial welcome was extended by the Gas Company. The Directors regarded such gatherings as helpful to themselves and to everyone concerned. In making Mr. Caton their President, they had honoured the Company he served, as well as him.

Mr. CATON, in rising to respond, tendered the warmest thanks of the Association to the Chairman and Directors of the Company for their kind hospitality, which he took as a personal compliment and honour to himself. They had all along displayed the greatest enthusiasm with regard to his Presidency of the Association.

Mr. JAMES PATERSON submitted "Kindred Associations," remarking that it was a matter of the greatest satisfaction to them all that this year both the President of the Institution of Gas Engineers and the President of their Association should be men from the Midlands. The President of the Wales and Monmouthshire Institution (Mr. Johns) was also at one time a member of the Midland Association.

Mr. W. H. JOHNS, in response, said Mr. Caton was one of his oldest friends in the gas industry, and he was proud to see him in the position he occupied that day. He congratulated the Board and their Engineer on the splendid lay-out of the new plant, and felt positive that the very best results could be expected from it. Care and forethought were evident in all directions. ["Hear, hear."] Mr. Caton for many years faithfully served Mr. Ferguson Bell; and it was very gratifying to find Mr. Bell present to support him.

The DEPUTY-MAYOR proposed "The University of Oxford," which was responded to by the Rev. G. CRONSHAW (Bursar of Queen's College).

Luncheon was succeeded by a short business meeting in the Council Chamber, at which one or two formal announcements were made.

A delightful afternoon followed, visits being made to a number of the principal Colleges, under the able guidance of Dr. Druce, Mr. James Eldridge, and Mr. Harry Paintin—thanks to whom were voiced by Mr. Bell. Tea with the President and Mrs. Caton (for which they were heartily thanked on the proposition of the Vice-President, Mr. F. C. Briggs, seconded by Mr. P. N. Langford) ended a thoroughly enjoyable day.

INTERNATIONAL COMMISSION ON ILLUMINATION

(*Concluded from Vol.* 169, *p.* 606.)

The Plenary Meeting of the Sixth Session of the Commission was held on the morning of the last day of the meeting, at Geneva—Dr. HYDE, the President, occupying the Chair.

The GENERAL SECRETARY (Mr. J. W. T. Walsh) read various messages of goodwill which had been received from the President of the Canton of Geneva, the Institution of Gas Engineers, the Belgian Association of Gas Engineers (who intend to apply for representation on the Commission), the Société Technique de l'Industrie du Gaz en France, Snr. Artigas, of Madrid, Sig. Bordoni (Italy), and M. Rouland, of Paris.

The whole morning was devoted to the consideration and adoption of various resolutions resulting from the work done at the technical meetings, to the election of officers, and to the submission of the triennial budget of expenditure.

The report of the National Illumination Committee of Great Britain will be published next week.

The following were elected as officers for the next meeting, which it was decided should be held in the United States of America, in 1927, preferably in the autumn:

President.—Dr. E. P. Hyde (re-elected).

Vice-Presidents.—Sig. Semenza (Italy), M. Rouland (France), and Col. Edgcumbe (Great Britain).

Hon. Secretary and Treasurer.—Mr. C. C. Paterson.

General Secretary.—Mr. J. W. T. Walsh.

After expressions of thanks to Sir Joseph Petaval, Director of the National Physical Laboratory, for his valued co-operation, the Treasurer's recommendations were adopted.

A hearty vote of thanks was passed to the Swiss National Committee for their generous and helpful entertainment of the Commission during the meeting at Geneva, and for the exceedingly efficient arrangements which they had made for the accommodation and business of the Commission. Appreciative reference was also made to the assistance received from the State Council of the Canton of Geneva, and to the League of Nations for the provision of two excellent French and English interpreters.

SOCIAL AMENITIES.

It only remains to refer to the hospitable arrangements made by the Genevese town authorities, and other hosts, for the social entertainment of the delegates who attended the meeting.

On the Tuesday evening a dinner was given by the Administrative Council of Geneva, at a restaurant on the banks of

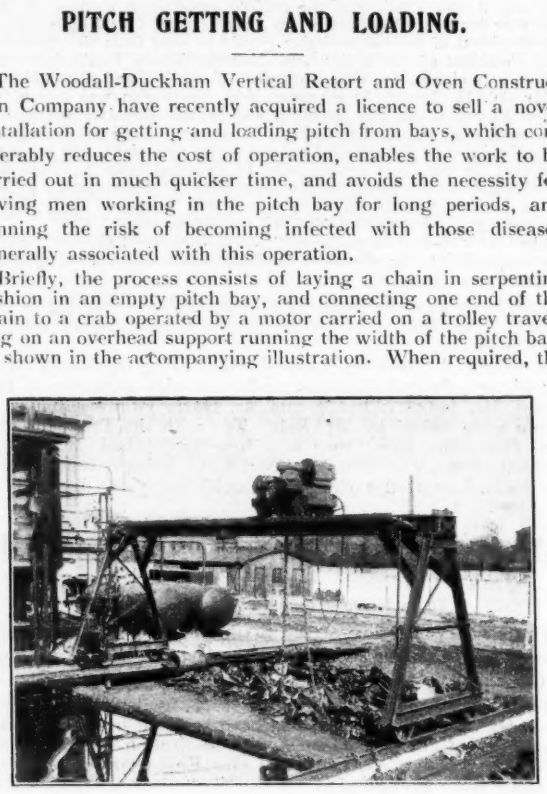
the lake—Belle Rive. The Swiss National Committee gave a dinner at the Hôtel des Bergues the next evening. M. A. Filliol, Director of the Electrical Service of Geneva, was President of this Committee, and M. F. Largiader acted as Secretary. Both gentlemen were indefatigable in attending to the comfort of all.

Thursday afternoon was occupied by a visit to the Labour Bureau of the League of Nations and to the Office of the League of Nations itself—Hôtel des Nations. At both places the members were invited to ask questions on the constitution, operation, and utility of these international organizations. Much interesting and useful information was communicated; and the thanks of the Commission for the courtesy extended were suitably expressed by Dr. Hyde, the President. On the evening of Thursday another enjoyable reunion took place, consisting of a dinner given by the Commission to their Genevese hosts and to other guests. It was held at the Parc des Eaux-Vines, delightfully situated near the lake.

PITCH GETTING AND LOADING.

The Woodall-Duckham Vertical Retort and Oven Construction Company have recently acquired a licence to sell a novel installation for getting and loading pitch from bays, which considerably reduces the cost of operation, enables the work to be carried out in much quicker time, and avoids the necessity for having men working in the pitch bay for long periods, and running the risk of becoming infected with those diseases generally associated with this operation.

Briefly, the process consists of laying a chain in serpentine fashion in an empty pitch bay, and connecting one end of the chain to a crab operated by a motor carried on a trolley travelling on an overhead support running the width of the pitch bay, as shown in the accompanying illustration. When required, the



support for the trolley can be moved along the bay by means of hand-operated gears. After the chain has been laid, pitch is run into the bay to a depth of approximately 20 in., and is then allowed to set, after which another chain is laid on the cold pitch, and a similar depth of pitch is again run in, and allowed to set. The numbers of layers of pitch which can be laid in this fashion is governed by the depth of the bay. When it is desired to "get" the pitch, the crab on the trolley is put into operation, and starts hauling on the uppermost chain. The crab and motor travel to the point of attack automatically, gradually drawing-up the chain from the bay, and in so doing breaking-up the pitch into pieces, the maximum size of which is roughly 20 in. square.

The method employed for pulling the chain is such that the whole operation can be carried out, at the rate of 4 ft. of chain per minute, by a motor of approximately 5 B.H.P.

The pitch, which should be run into the bay at a temperature of not more than 250° C., has no effect on the links of the chain; and practically no dust is produced during the operation of breaking.

After the material has been broken-up, it is conveyed into trucks by means of a small movable loading conveyor. By this system it is possible to break-up pitch at 1·5d. per ton, and load into railway wagons alongside the bay at 3d. per ton.

One of these installations has been in operation at Kiel for two years, and it can be safely stated that the maintenance cost is extremely small.

Gas Mantles Committee.—The Committee appointed by the President of the Board of Trade to inquire into, and report upon, an application made by the Incandescent Mantle Manufacturers' Association for the imposition of a duty upon gas mantles, propose to hold public sittings for the taking of evidence at 10.15 a.m. on Friday, May 22, and Monday, May 25, at the Board of Trade, Great George Street, London, S.W.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

The Third Annual Meeting was held at Newport on Saturday, May 2.

Mr. B. J. Bell (President) said that they were honoured by the presence of Mr. J. H. Canning, of Newport.

Mr. J. H. Canning, on behalf of the Chairman and Directors of the Newport (Mon.) Gas Company, welcomed the Association. He congratulated the Association upon the well-deserved success achieved, which was largely due to the enthusiastic way in which the members had taken up the work. Mr. Canning referred to the intensified electrical competition with which the gas industry now had to cope. At Newport they were displacing many electric cookers and heating appliances. He counselled them all, whatever their position in the industry, to use their best endeavours to keep in close touch with the public, and strive to give consumers the facts. If they were to do this, however, they must be able to speak of the merits of gas. He encouraged the members to cultivate the art of public speaking.

Mr. Bell moved a vote of thanks to the Chairman and Directors of the Newport Gas Company for their hospitality and kindness in affording facilities for their meeting, and also to Mr. J. H. Canning for his presence and encouragement.

Mr. R. G. Shute (Cardiff) seconded the motion, which was carried with acclamation.

Statement of Accounts.

In the absence of Mr. R. J. Auckland, the Hon. Treasurer, the statement of accounts for the past year was presented by Mr. Osborne (Cardiff). The total income amounted to £38 18s. 5d., and the expenditure to £30 9s. 11d., leaving a balance in hand of £8 8s. 6d.

The President said that the position disclosed was eminently satisfactory; and he took the opportunity of informing the meeting of the generosity of Mr. T. Noall (Cardiff), one of their members, who had contributed £2 2s. to their funds.

Following discussion, the statement of accounts was passed on the proposition of Mr. Shute, seconded by Mr. C. S. Bateman (Cardiff).

The report of the Council was read by the Secretary, Mr. W. E. Crowley.

Mr. J. Hislop moved, and Mr. T. A. Canning seconded, that the report be accepted, and an expression of the thanks of the Association to the Council and Secretary be recorded.

The President supported, paying a warm tribute to the work of the Secretary.

The motion was carried with acclamation.

The Secretary announced that he had received a letter from Mr. R. J. Auckland, resigning the office of Hon. Treasurer to the Association.

It was resolved, on the proposition of Mr. Hislop, seconded by Mr. C. S. Thane (Newport), that Mr. Auckland's resignation be accepted, and that he be thanked for his services as Hon. Treasurer, and for the invaluable support he had at all times given to the Association.

On the proposition of Mr. R. J. Williams (Abertillery), seconded by Mr. H. G. Brown (Cardiff), it was unanimously decided to ask Mr. R. J. Auckland to accept election as the first Honorary Member of the Association.

The President declared the result of the election of officers and Council for the following session:

President.—Mr. J. Wood, Pentre.
Senior Vice-President.—Mr. D. M. John, Aberdare.
Junior Vice-President.—Mr. C. S. Bateman, Cardiff.
Hon. Treasurer.—Mr. A. H. Shepperd, Swansea.
Hon. Secretary.—Mr. W. E. Crowley, Newport.
Auditors.—Mr. R. E. Foster, Cardiff, and Mr. T. Noall, Cardiff.
Members of Council.—Messrs. T. Hunt, Porth; C. H. Collins, Swansea; G. H. G. Hughes, Chepstow; and V. T. Blake, Cardiff.

Mr. T. A. Canning (Newport) proposed that the rules of the Association be amended to permit of an associate membership class being formed.

Mr. G. H. G. Hughes (Chepstow) seconded the motion, which was supported by Mr. Collins (Swansea) and Mr. T. Smith (Cardiff).

The proposition was carried unanimously.

Mr. T. A. Canning moved that the Association extend a sincere vote of condolence to the relatives of the late Mr. H. E. Jones. The work of the late Mr. Jones was too well known to need reiteration, but it might be pointed out that at one time he had been engaged at Pontypridd.

The vote was seconded by Mr. Bateman, and accorded by the members standing in silent respect.

Votes of thanks to the President and to the Scrutineers and Auditors concluded the meeting.

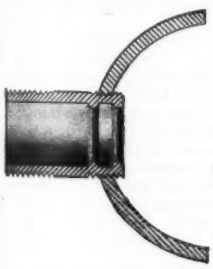
THE "DU-EX" NIPPLE.

It is now a number of years since steel tubes first began to set fresh problems in mainlaying. One of these problems concerned the connecting of services to a main whose shell was of much less thickness than had formerly been negotiated with screw threads, but was, at the same time, of far greater strength. It was necessary to provide some device that would make use of the strength and also provide soundness.

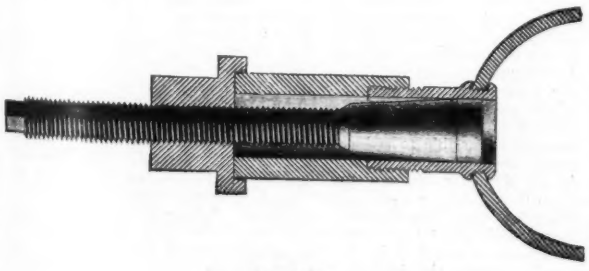
The inventor of the expansion nipple perceived that, by expanding or riveting a nipple against the interior of the wall of the main, strength could be obtained to pull against, and this strength could be utilized for the pressing down of an exterior saddle joint with gutta percha ring—the latter to be depended upon for soundness.

A great deal of experiment was made to determine the exact shape of this saddle joint, and tests were carried out under drastic conditions. The sizes chosen for the tests as an extreme proposition were a 1 in. nipple screwed into a 3 in. main, a ratio of 1 to 3, though 1 in 4 is recommended in general practice. The expansion nipple and saddle joint, which have held the field for so many years, passed this initial test; and, provided the nipple has been screwed right home and expanded truly within the main, the joint has been so satisfactory as to add not a little to the utility of steel mains.

True progress, especially in these days when economy is vital to industry, should move in the direction of simplicity. Now the "Du-Ex" nipple has been devised to supersede the expansion nipple. By an ingenious adaptation of the original idea, the expansion nipple is to be rendered independent of its adjunct, the saddle joint. A second expansion has been added, without increase of cost for the nipple, and making no difference in the method of working, or the tools employed; but it does away with the saddle and packing ring. The "Du-Ex" nipple gives soundness as well as strength; it has passed the drastic test of a 1 in. nipple in a 3 in. main. A glance at the illustrations will show how the nipple is formed—with two internal ledges, the one for expansion inside the main, and the other outside. Thus the expansion is now effected evenly against the wall of the main, and the threads of nipple and main, though few in number, are so evenly pressed together that no fluid can escape. Here again, as with the single expansion nipple, it is, of course, essential that the nipple shall be screwed right home. The space between the two ledges by which the nipple is expanded is commensurate with the thickness of the wall of the main, or, rather, with the thickness *plus* the curve, for small mains with less gauge and more curve take the same nipple as the larger mains with thicker gauge and less curve. Here is simplicity exemplified, for, without the saddle joint, it is no longer necessary to specify the size of main, and the "Du-Ex" nipple can be stocked merely in accordance with the diameter of services.



Before Expansion.



Expanded.

In case there should be any reader not familiar with the working of the expansion-nipple, we reproduce the routine for the "Du-Ex," as laid down by the makers:

The main is drilled and tapped as usual (with special combination drill-taps provided) and the "Du-Ex" nipple is screwed-in, with the mandrel sleeve and nut attached. Then, by means of a ratchet spanner, the nut is turned, and the mandrel thereby drawn out until it has passed both ledges. It then comes away free, leaving the nipple firmly gripped in the main—so firmly indeed that it cannot be unscrewed by any ordinary means, or wrenched out by any conceivable accident.

In service laying it remains to give the exterior of the "Du-Ex" connection a similar coating and wrapping to that which is usually applied to the main joints. Engineers who desire to make assurance doubly sure, and do not mind the extra expense and the inconvenience of keeping stock, can yet add the saddle and packing ring to the "Du-Ex" nipple. It is a remarkable convenience that the introduction of this improvement makes no disturbance to existing tools or methods.

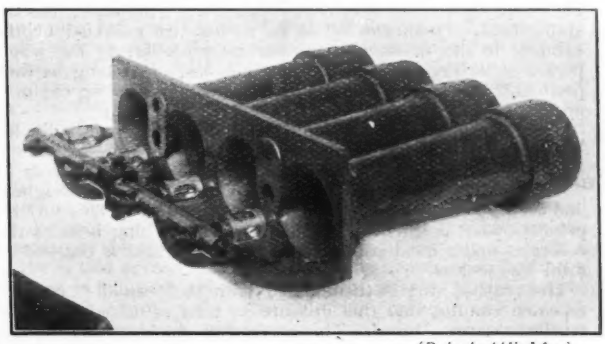
For spun cast-iron pipes the thickness of which is greater than that of steel, but less than cast-iron, the "Du-Ex" nipple is made with a greater space between the two expansion ledges.

The patent for the "Du-Ex" nipple is in the names of T. W. Meakin, B. R. Parkinson, and the firm of J. Stone & Co., Ltd., of Deptford (the latter are also the sole manufacturers).

WILTON'S PATENT ECONOMY JETS FOR FORCED-DRAUGHT FURNACES.

Users of steam-jet operated forced-draught furnaces burning low-grade fuels will be further interested in the latest improvements by the Chemical Engineering & Wilton's Patent Furnace Company, Ltd., in the furnaces manufactured and sold by them. With this improvement, besides being able to burn the cheapest and lowest-grade fuels without affecting the efficiency and evaporative power of the boiler, they will be able to effect further saving of fuel by fitting the new design of blowing apparatus to their existing grates.

After numerous and careful experiments carried-out along strictly scientific lines and under actual working conditions, it was found that the amount of steam used to create the blast on various kinds of steam-jet operated grates was excessive, especially when burning the lower grades of fuel.

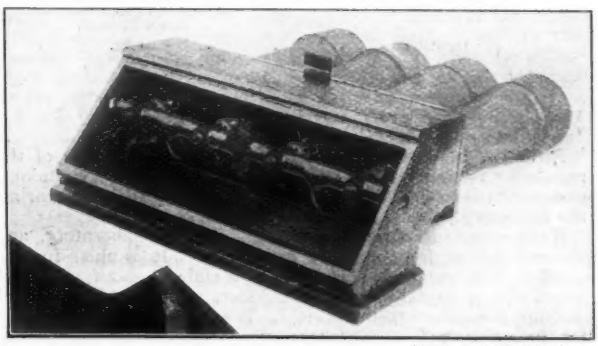


(Patent applied for.)

Blower with Bridge and New Type Jets (Silencing box removed).

The blowing apparatus has been redesigned, and can be fitted to almost any furnace of this type, while the new jets, which embody a slight but important modification of the venturi principle, have been found to reduce to the extent of 55 p.ct. the amount of steam required to produce the maximum blast. While the efficiency has been increased by this amount, the new blowers provide exactly the same amount of air throughout the furnace grate as hitherto, at equal static pressure over the whole grate area.

The saving which can be effected is remarkable, and the engineer using this type of grate who requires to reduce his fuel costs to the minimum should not hesitate to adopt these new principles in his existing Wilton furnaces. It was found



(Patent applied for.)

Blower Jets and Silencing Box (Cover removed).

that on a Lancashire boiler evaporating 3246 lbs. of water per hour, burning coke breeze of a calorific value of 10,000 B.Th.U. per lb., a saving of 6 cwt. of fuel per day was possible, representing, when working 7 days a week and 24 hours each day, a saving of 42 cwt. per week. The furnaces are covered by patents and protected designs. It may be added that the latest pamphlet regarding this is of great interest, and the makers will be pleased to furnish copies to all who care to apply.

SAMPLING OF COAL.

[Abstract of a Paper by F. H. Walker, B.Sc., A.I.C., of the South Metropolitan Gas Company, before the Newcastle Section of the Society of Chemical Industry.]

Accuracy in sampling depends mainly on:

1. The collection of a sample evenly from all parts of the bulk to be sampled.
2. The ratio of the weight of the sample to the weight of the bulk to be sampled.
3. The ratio of the largest pieces of impurity in the sample to the weight of the sample collected.
4. The fineness to which the sample is crushed for each stage in its reduction.
5. Proper mixing before each reduction.

It is very necessary, when collecting samples from trucks, to take portions from the bottom and middle parts of the load, and not only from the top. In a certain case a truck was found to contain coal at the bottom with an ash content of 8 p.ct. more than that at the top.

Sampling Cargoes of Gas Coal from the Northumberland and Durham Coalfields.

The sampling and inspection staff consists of six samplers and four youths, under the supervision of an inspector. Covered accommodation is available on the ships, with an iron floor on which samples may be crushed without fear of contamination. This cabin is not used for any other purpose. The samplers aim at collecting four or more "gross samples," each approximately 1000 lbs. in weight, from each cargo.

A gross sample is collected by plunging a special sampling ladle into the stream of coal as it pours from the shoot into the ship's hold. Quantities of 10 to 20 lbs. are collected by the sampler in this manner at regular intervals during the whole period of loading each of the four hatches, or as long as time permits. The collected coal is carried to the sampling cabin in ordinary buckets.

When the collection is completed, the gross sample is divided into two parts—over ½ in., and less than ½ in. size—by screening, and the weight of each part ascertained. The pieces of dirt are then picked out by hand from the larger size, weighed, and well pulverized by means of an iron punner. This dirt represents what ought to be removed on the picking belts at the collieries under ideal conditions. The large coal is crushed to 1 in. size or less.

The crushed dirt is then mixed with the "small" coal by repeated coning, and this mixture in turn is mixed with the crushed "large" coal. This method of crushing and mixing is adopted to render more certain the even distribution of the dirt in the sample. Great importance is attached to the proper mixing of the gross sample before the first reduction. The difficulty of carrying out this operation by hand labour renders undesirable the collection of gross samples of more than 1000 to 1200 lbs. The first reduction of the gross sample to 500 lbs. is made by the long pile and alternate shovel methods. This system of reduction is more convenient than the cone method in a limited floor space; it possesses no other advantage.

The subsequent crushing and reduction are carried out in a similar manner to that described in Bulletin No. 116 of the U.S. Bureau of Mines, with the exception that all mixing is carried out on the iron floor, and not on a blanket. An iron sample cutter is used to facilitate the divisions of cones into four parts.

The samplers are instructed to crush the coal and impurities at each stage in accordance with the sizes in the following table, as judged by the eye:

Weight of Sample to be Divided.	Approximate Largest Size of Coal and Dirt Allowable before Division.
1000 lbs.	1 in.
500 ,,	¾ ,,
250 ,,	½ ,,
125 ,,	⅜ ,,
60 ,,	¼ ,,
30 ,,	3/16 ,,

After the final reduction to about 7 lbs., the whole of the remainder is transferred to a special air-tight copper container, and conveyed to the laboratory accompanied by a ticket bearing the necessary particulars.

Each sample is air-dried after arrival at the laboratory, and the amount of free moisture estimated. It is then further crushed in a jaw-crusher, reduced by a riffle to about 1 lb., and ground in a specially-designed grinder, and the whole passed through a standard 60-mesh sieve. It is then well mixed, ready for analysis.

This method of collecting samples of run-of-mine gas coals might have to be modified in cases in which the proportion of large coal was greater—namely, pieces more than 9 in. or so in diameter. The use of a larger collecting bucket or ladle is not considered practicable, owing to the greater strain on the sampler, and the force with which the coal pours from the shoot. Any systems of collection must be designed to avoid over-taxing the endurance of the sampler, and be capable of being properly carried out under all conditions likely to arise by day or by night, and in all weather. Covered galvanized bins are used for storing part samples during collection in cases where two or more kinds of coal are being loaded in alternate batches, and it is necessary to collect two or more samples simultaneously.

When this method of sampling was being worked out, before full operation, the accuracy was tested by having two or more samples taken simultaneously from the same batch of coal. This check is still carried out from time to time. Two or more samplers collect, crush, and reduce samples independently. The results obtained from 26 such experiments were satisfactory from a practical point of view; and the deviation from the mean does not in any case exceed ± 1 p.ct. for the samples of 1000 lbs. This includes the total errors due to sampling and analysis; but the errors in ash determination are, of course, very small. The experiments were carried out on coals of various qualities, and the errors in samples of high-ash coals do not differ very much from those of lower ash content. For 750 lb. samples, the deviation from the mean does not exceed ± 1·32 p.ct. Utilizing these figures in the probability integral, it was calculated that only two samples in every hundred are likely to be out by more than 1 p.ct.

Discussion.

Dr. Henry Louis, in a written communication, stated that he had often tried to put sampling on a purely mathematical basis as a problem in probabilities, but so far had always had to abandon the attempt and fall back on rule-of-thumb methods derived from experience. He could not help thinking that a method of sampling which allowed errors of ± 1 p.ct. was not good enough as compared with the refined methods of laboratory analysis.

Dr. J. T. Dunn congratulated Mr. Walker on the large amount of work that had been accomplished on this important subject. The exact method of sampling was largely a question of practicability. He took many samples from trucks by the "hammer-and-shovel" method, and had found the results to agree remarkably well, considering the objections to that system. In one case a large sample of 23,000 lbs. was collected under special conditions, and another sample taken from the same batch by the hammer and shovel method. The results for the percentage of ash differed only by 0·2 p.ct.

Dr. W. B. Davidson remarked that he used the method of sampling described, and entirely agreed with what Mr. Walker had said. He would like to ask the author if he had dealt with cases of washed small coal.

Mr. Drury pointed out that "ladle" sampling was not satisfactory in cases where coals had been screened and "rough picked;" the larger material usually lying above the smaller in the same truck.

Mr. Hewson asked whether the sampling ladle was plunged right into the stream, or whether the portions were collected from the sides. What number of portions were collected from each truck?

Mr. Sensicle asked what Mr. Walker would do if a piece of stone 14 in. long was caught in the sample. If a piece this size was in a truck, it would be necessary to take the whole truck for a sample. The convention of reporting results of analysis to two or three decimal places still persisted, though the errors in sampling were as much as 1 p.ct., even with great care. Sometimes he had no option but to take his samples from trucks. He had adopted the method of breaking up all the coal in a section of each truck, and then taking portions from this section. This plan was fairly accurate, if the coal was homogeneous.

Major F. J. Bywater said he did not believe that a proper representative sample could be taken from the top of a truck. He hoped the Committee of the Fuel Research Board on sampling would not recommend any method of collecting samples from coal at rest in trucks.

The Chairman (Dr. G. Weyman) referred to the importance of training the sampler, by the methods described by Mr. Walker. He said it was a very difficult matter to sample coal in many gas-works, as the coal was usually mixed before crushing.

Mr. Walker replied briefly to the discussion. His samplers were instructed to plunge the ladle into the middle of the stream of coal. First runnings and small side trickles were avoided. Sampling from the tops of trucks was very unsatisfactory. Accidental agreement might occur in one or two cases. It was necessary to test any method of sampling by taking a large number of observations. It was often possible to reduce the weight of the gross sample in some cases, as with washed nuts, when the bulk was fairly homogeneous. As the diameter of the sampling ladle bucket was 9 in., it was not often that pieces of coal larger than this were caught. Larger pieces did get wedged into the bucket at times. Large pieces of stone were more easily picked out on the picking belts; and it was generally pieces up to about 4 in. in size which escaped detection. His aim was to plunge the bucket into the stream often enough to reduce to a minimum the chances of catching an unfair proportion of dirt. The picking-out of dirt, either from a sample or on the picking belts, was obviously a difficult matter. It was not always possible to tell at a glance whether a piece was dull coal or a bit of dirt band. At least two colliery companies had agreed to accept the method as fair.

Wales and Monmouthshire Institution.—The meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers will take place at Porthcawl on the 28th inst., when Mr. H. D. Madden, of Cardiff, will read a paper on "General Sales Propaganda."

National Gas Council Meeting.—Arrangements have been made for the seventh annual general meeting of the National Gas Council of Great Britain and Ireland to be held at the Hotel Great Central, Marylebone Road, London, N.W., on Tuesday, May 26, at 11.30. The President (Mr. D. Milne Watson) will present the annual report and statement of accounts.

INCOME-TAX ALLOWANCES FOR WEAR AND TEAR OF GAS-WORKS PLANT—

INCLUDING METERS, PREPAYMENT METERS, GAS STOVES, FIRES, &c.

By W. M. GALLEWAY, of Whitby.

[Before the North of England Gas Managers' Association, May 1]

In complying with the request of your Committee to give a paper at this meeting, the writer is desirous, if possible, of assisting the secretaries and managers of small or medium undertakings, who, like himself, are responsible for the administrative, as well as the productive, departments of a gas company. One of the largest items of standing charges consists of rates and taxes. This paper deals with the latter, of which income-tax forms the principal part.

Prior to the year 1912, gas undertakings were placed in an anomalous position as compared with electric lighting undertakings, for, whereas the former were not allowed any depreciation whatever, the latter were allowed depreciation at the rate of 3 p.ct. on cables and 5 p.ct. on plant and machinery. In that year, however, a special meeting of the Institution of Gas Engineers was held, at which, very appositely, Mr. Robert Shadbolt, the brother of our President, occupied the chair. As the result of that meeting a scheme was evolved which has been adopted by many undertakings.

The scheme is as follows:

GAS UNDERTAKINGS OTHER THAN THOSE OWNED BY MUNICIPAL OR OTHER PUBLIC AUTHORITIES.

SCHEME FOR DETERMINING THE INCOME-TAX ALLOWANCES TO BE GRANTED FOR WEAR AND TEAR AND MAINTENANCE.

PLANT, MACHINERY, AND MAINS.

1. No depreciation shall be allowed in respect of the plant, machinery, and mains, other than as specified hereinafter; but *in lieu* thereof all expenditure on repairs and renewals is to be charged in the company's accounts for income-tax purposes and allowed as working expenses, as and when incurred. All expenditure on extensions and improvements, where debited against revenue, to be distinguished and excluded from the said allowances.
2. Provided that, whenever any expenditure on such renewals is incurred and full effect cannot be given to its deduction in the year when incurred, owing to the profits or gains chargeable with income-tax in such year being less than the amount so expended, the balance of the said expenditure which has not been allowed may be carried forward and allowed in the following year or years, as is provided in the case of unallowed wear and tear by section 26 (3) of the Finance Act, 1907.

GASHOLDERS.

3. In addition to repairs, depreciation shall be allowed at the rate of 3 p.ct. per annum on the written-down value—such value not to include tanks, except where constructed of steel or iron; and in no case is the cost of excavation to be included in the value upon which the depreciation allowance is computed.

METERS (ORDINARY AND PREPAYMENT), COOKERS, AND GAS FIRES.

4. In addition to repairs, allowance for depreciation shall be granted at the rate of 10 p.ct. per annum on the written-down value.

SERVICES AND FITTINGS.

5. No depreciation shall be allowed in respect of services and fittings; but *in lieu* thereof all expenditure shall be allowed as a trading expense as and when incurred. "Services" are to be understood as representing the pipes which connect the street mains with the properties served. "Fittings" are the pipes, pendants, and brackets within such properties, supplied by and at the cost of the Company. Where fittings so supplied are removed by the Company at any time, they shall be brought back into stock, if of any value, and re-issued without any charge against revenue except for the cost of repairs necessary to enable them to be re-issued. In the event of their not being re-issued, revenue shall be credited with the scrap value.

GENERAL.

6. In all cases where depreciation allowances are granted, renewals, if charged against revenue, shall be carefully distinguished and notified to the surveyor, in order that they may be added back to profits for the purpose of arriving at the income-tax liability.
7. If new works are erected, wholly or partially, on a new site, in place of old works abandoned or demolished, a reasonable allowance shall be granted for renewals in respect of the displaced plant, so far as it is actually renewed—such allowance to have regard to the original cost of the displaced plant, *less* any depreciation that may have been granted, but such allowance shall not include the cost of preparing the new site or erecting foundations for the new plant.
8. All renewals of parts which do not destroy the identity of the original article shall be allowed as repairs, except so far as they constitute an extension, enlargement, or other similar improvement in value.
9. Where renewals are allowable under this scheme, *in lieu* of depreciation, they shall be allowed notwithstanding that the cost thereof may not have been debited in the Company's accounts against revenue.
10. "Written-down value" means original prime cost, *plus* subsequent additions (including renewals which have not been allowed for income-tax purposes), *less* all allowances actually granted for income-tax purposes in past years in respect of depreciation.
11. "Expenditure" includes the sum expended on materials, labour, and incidentals.
12. This scheme shall take effect for the year 1912-13 and future years, and for years preceding where claims of depreciation are now awaiting settlement.
13. Where in any case allowances for depreciation have been made which are now to be discontinued, and they have not been exhausted by renewals already effected, the amount of such unexhausted allowances shall be deducted from the expenditure on future renewals as and when they are effected.

We desire to adopt the above arrangements, and hereby undertake to fulfil the conditions thereof.

On behalf of.....

Dated the ..... day of ....., 191.....

....., Chairman.

....., Secretary.

In 1915 the Directors of the Company I have the honour to serve decided to adopt the scheme; but before giving notice to the Income-Tax Surveyor to that effect, referred the matter to a Rating Association of which they were members, and submitted copious extracts of capital expenditure on gasholders, meters, cookers, and gas fires. The reply from the Association was to the following effect.

"The figures suggested for forming the basis of a claim are suitable ones, although our Surveyor questions whether the Surveyor of Taxes will accept them. It is however quite in accordance with the terms of the agreement, and should be contended for. It is possible that the Surveyor of Taxes may only offer to agree to commence depreciation at the present value, and that will then open-up the question of past depreciation. It must be remembered, however, that, by claiming depreciation of the first cost owing to no depreciation having been claimed or allowed in the past, you are starting your depreciation on a higher basis, and at a time when the rate in the pound has been increased. Our Surveyor questions whether the Commissioners would agree to open-up past depreciation which has been allowed, and at the same time agree to a scheme brought forward for the purpose of blotting-out the past and starting afresh with a uniform and agreed basis. Although no depreciation had been allowed in the past, the question might arise as to the charges which have been made to revenue for renewals and possibly additions; but of this we have no knowledge. Any dispute or claim which may arise would probably involve an investigation upon these points.

"Our Surveyor suggests that, assuming you are clear on the question of renewals and improvements charged to revenue, you should request the scheme to be put into action, and forward your claim to the Surveyor of Taxes, and await any counter suggestion. From experience which he has had of other cases, the scheme produces a result favourable to the Gas Company, and in such cases it would seem that the Commissioners have made a bad bargain."

Acting upon the suggestion, a request (accompanied with extracts from the ledgers showing the capital expenditure) was sent to the Surveyor of Taxes, together with the suggestion that the writer and an auditor of the Company should wait upon him, and produce evidence in support of the application. This, however, was declined, and a counter suggestion made that the Surveyor should call and inspect the Company's books. The result of this subsequent inspection was that the Surveyor admitted our claim, and the scheme was put into operation and worked until 1921 without any exception being taken by the Revenue Authorities, notwithstanding the fact that the allowances for wear and tear exceeded the amount of tax deducted for the interest and dividends paid annually to shareholders.

A new Inspector of Taxes was appointed for the district about this time, and to our surprise refused to allow depreciation at the rates to which the Company were entitled, and which they had been allowed from their adoption of the scheme; his contention being that the Directors were compelled by the Customs and Inland Revenue Act, 1888, section 24, sub-section (3), to pay over to the Commissioners of Inland Revenue the full amount of the tax deducted from dividends and interest paid to the debenture stockholders and shareholders from year to year, irrespective of any claim which the Directors had for depreciation. He intended in future to allow only a sum equal to the amount written-off annually for depreciation as shown in the statements of accounts.

The Directors contended they were entitled to the full allowance of 3 p.ct. and 10 p.ct. respectively on gasholders, meters, gas stoves, &c., which the scheme provided for; and as the allowances had been granted for several years without question, there was no reasonable ground for raising an objection to what had become an established precedent. As the question of depreciation allowance was a most important one, they decided to obtain expert opinion. This opinion was favourable to their view, but it was decided on the expert's advice to obtain Counsel's opinion also. Counsel having further confirmed the

Directors' contention, the Inspector's objection was withdrawn, and the scheme is still in operation.

Statement A shows the form of statement of liability submitted annually.

STATEMENT A.

Statement showing the Amount of Liability for Income-Tax, Schedule D.

	£	s.	d.	£	s.	d.
(1) Profit as per revenue account . . .						
(2) *Add*:						
Depreciation on gas stoves, &c. . .						
Interest allowed by bankers (if any)						
(3) *Deduct*:						
Allowance under Finance Act, 1919, section 18						
Interest charged by bankers (if any)						
Schedule A (offices, &c.)						
(3a) Income-tax carried to credit of rates account						
(4) Allowance for wear and tear of gasholders:						
Capital cost *less* previous allowances, £ at 3 p.c.						
Allowance for wear and tear of meters, prepayment meters, gas stoves, and fires:						
Capital cost *less* previous allowances . £						
Add expenditure during current year						
£ at 10 p.c.						
Net amount of liability for tax .						

The amount of liability under Schedule D, item No. 1, requires no explanation.

Item No. 2.—The income-tax authorities claim tax on all sums written off through revenue account for depreciation.

Item No. 3.—Under the Finance Act, 1919, section 18, gas undertakings are allowed for repairs a sum equal to one-sixth of the value of the Company's buildings which contain machinery, which was agreed by the Surveyor of Taxes and ourselves at £240, with £40 per annum allowance.

Item No. 3a.—Income-tax account was in credit in consequence of the allowances being in excess of the amount of tax deducted from debenture interest and dividends; and as the Company were entitled to charge the full amount paid in rates, they claimed, and were allowed, the balance of income-tax credited to rates account.

Item No. 4.—Is self-explanatory.

Statement B shows the annual amounts allowed for wear and tear during the several years in which the scheme has operated.

STATEMENT B.

Amount of Allowances Received in the Several Years during which the Scheme has been in Operation.

—	Gross Amount of Taxable Profits after making necessary additions.	Allowance for Wear and Tear.	Net Amount of Taxable Profits.
	£	£	£
Year ending Dec. 31, 1915 . . .	2,354	1,137	1,217
,, ,, ,, 1916 . . .	2,334	1,139	1,195
,, ,, ,, 1917 . . .	2,118	1,048	1,070
,, ,, ,, 1918 . . .	2,076	964	1,112
,, ,, ,, 1919 . . .	2,171	887	1,284
,, ,, ,, 1920 . . .	2,552	823	1,729
* ,, ,, ,, 1921 . . .	1,935	903	1,032
* ,, ,, ,, 1922 . . .	1,937	832	1,105
,, ,, ,, 1923 . . .	3,983	691	3,292
,, ,, ,, 1924 . . .	4,218	669	3,549
,, ,, ,, 1925-26 . .	3,430	645	2,785
	£29,108	£9,738	£19,370

* During these years the allowance was increased 50 p.c. on gasholders—viz., 4½ p.c. instead of 3 p.c.

Statement B proves beyond question that the scheme confers substantial benefits upon the undertakings that have already adopted it; and those undertakings that are entitled thereto would, in our opinion, do well to give serious consideration as to whether it is not to their interest to claim the allowances which it grants.

Discussion.

The Chairman said the paper was another instance of the value of careful records. It would be of special interest to company undertakings.

Mr. Herbert Lees mentioned that he was present at the meeting of the Institution of Gas Engineers when the scheme was discussed, and his recollection of it was that those present were by no means unanimous as to its benefits to the gas industry. He adopted the system and it worked well.

Mr. T. P. Ridley (Newcastle) remarked that his Company had adopted the scheme.

Mr. Norman S. Cox did not think the scheme was to the advantage of the industry. His Company had not adopted it.

Mr. R. Wood (Barnard Castle) said that his Company had adopted the scheme to advantage.

NEW COLLIER FOR THE SOUTH METROPOLITAN GAS COMPANY.

On Saturday last, May 9, the s.s. "Redriff" was launched for the South Metropolitan Gas Company from the yards of the Tyne Iron and Shipbuilding Company, Ltd., at Willington Quay-on-Tyne. She is a sister ship to the s.s. "Camberwell," which was launched from the same yard early last year, and which has given great satisfaction in the service of the Company. The two ships are of a type specially designed to carry coal from the Tyne to the Company's gas-works on the Thames. The total deadweight is 2435 tons, on a mean draft of about 18 ft. 2 in. The length between perpendiculars is 244 ft., breadth moulded 36 ft. 6 in., and depth moulded 20 ft. 6 in.

The launch was carried out with complete smoothness; and the christening ceremony was performed, as the ship started on her journey down the ways, by Mrs. Frank Jones, wife of the Vice-President of the Company. It had been anticipated that the naming would be performed by Mrs. C. C. Carpenter, and Mr. Jones later referred to the unfortunate inability of the President and his wife to be present after all. The large company, while greatly regretting her absence, would assure Mrs. Carpenter that the bottle was gracefully, but very efficiently, broken by her substitute. The traditional christening by wine was quite unnecessarily supplemented by a drenching thunder shower of unusual violence—the only one of the day—which began as the party mounted the platform, and ceased exactly as the ship reached the water.

The company then adjourned to the moulding loft (which was gaily decorated with nautical flags) for tea as the guests of the shipbuilders. The good ship was toasted, after which Mr. G. F. Mulherion (the Chairman) gave the health of the South Metropolitan Gas Company, coupled with the name of Mr. Frank Jones, to which the latter replied.

Afterwards Mr. Jones proposed the health of the Tyne Iron and Shipbuilding Company, Ltd. It was a sad sight, he said, to see the endless succession of idle yards on both banks of the river, and one could only hope that times would change.

Mr. Mulherion, in reply, enlarged on the serious position of British shipbuilding. To him it was very questionable whether the Government should allow British owners to send orders to the Continent for ships which could be delivered duty free. The boat just launched was the last order his firm had; and it was a terrible blow to him that his men should have no further prospect of work, while nothing was being done to prevent orders from going abroad.

Mr. Mulherion then presented a souvenir of the occasion to Mrs. Jones, who returned thanks in an appropriate and graceful speech.

Other toasts were the North-Eastern Marine Engineering Company, Ltd., who are supplying the engines for the boat, and Commander T. C. Anderson, R.N., Marine Superintendent of the South Metropolitan Gas Company, who paid a warm tribute to the workmanship, from top to bottom, of the Shipbuilding Company.

Among those present were Major F. J. Bywater, M.C. (the South Metropolitan Gas Company's representative in Newcastle), and Mrs. Bywater, Mr. T. Curr (Chief Engineer, East Greenwich), Mr. T. S. F. Gibson (Chief Constructional Engineer), Mr. R. C. Macdonald (Chief Mechanical Engineer), Mr. L. M. Boyce (Chief Engineering Clerk), Mr. F. P. Tarratt (Chief Engineer of the Newcastle and Gateshead Gas Company) and Mrs. Tarratt, Mr. T. P. Ridley (Secretary of the latter Company), and Mrs. Walter King, widow of the late Editor and former proprietor of the "Journal."

Birkenhead Gas Undertaking.—Speaking at a meeting of the Claughton Ward Conservative Association, Councillor S. Woodward said that under the chairmanship of Mr. Luke Lees the gas undertaking at Birkenhead had been changed entirely. The extensions had cost £200,000: and in view of the development of electricity, some people asked whether they were wise in expending such an amount. Experience had proved that the Gas Committee were justified in their action, for last year they had produced 1200 million c.ft. of gas, compared with 1104 millions in 1913—an increase of 5·7 p.ct. This showed that the gas undertaking had a great future before it. They had reduced the price to 3s. per 1000 c.ft., which compared very favourably with towns similarly situated. Had not the price of residuals fallen so much, the price of gas would have been reduced even further. He invited the ratepayers to visit the gas-works and see for themselves what had been done on their behalf in their own undertaking.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Low C.V. Gas and the Unaccounted-for Percentage.

SIR,—It is unfortunate that Mr. West should mar an otherwise excellent address [see "JOURNAL" for April 22, p. 237] by an unjustifiable condemnation of gas of 410 B.Th.U. per c.ft. value. The harmful effects of NH_3, O_2, HCN, H_2S, and SO_2 on meters and mains have been fully dealt with by the Gas Investigation Committee, and do not require further emphasis.

Mr. West stated that, for several years before he took charge, unpurified gas was being delivered to the town; and in the very next breath he said that low-grade gas was to blame for the drying of diaphragms and pitting of meters and mains. Coming from such a tainted source as Newark, the condemnation was discounted in its nativity. We should, however, be better pleased, and it would be a lesson to gas engineers to be certain of their facts before rushing into print, if the Technical Press were much more aggressive in their criticism of such ridiculous statements.

The difference in the unaccounted-for gas when sending out 410 and 475 B.Th.U. is merely a coincidence peculiar to Newark. The distribution of gas of low calorific value had nothing whatever to do with it. For the past ten years we in Greenock have been sending out gas of low calorific value. Our declared value is 410, and our average unaccounted-for gas during the period under review is 3·19 p.ct. Another important point is the cost of meter repairs; and if low-grade gas has the harmful effects attributed to it, one would expect the cost of these in our case to be much higher than in places where high calorific value gas is supplied. But a glance at the "Gas World" Analysis of Corporation Accounts does not show this to be the case. We have been through private meter repairing establishments and have examined meters stated to be from districts supplied with 475-500 gas; and their condition was a positive disgrace to the industry. Indeed, our meter repair bill is so normal that we feel that meter makers, in continuing to guarantee meters, are wronging those who, like ourselves, supply clean gas with a minimum of inerts. That portion of the cost of a meter due to the "guarantee" clause must be considerable; and it would be interesting to know who are getting the benefit of it. We are not.

We have examined meters which have been in use with 410 B.Th.U. gas for seven and ten years, and find the leather diaphragms are in excellent condition and show no sign of drying. The tin casings of the dry meters are quite as good as those of meters used for the same length of time with 500 gas.

The secret of the efficient use of town gas—its effect upon meters, &c.—lies in its purity and low inert content.

GEO. KEILLOR,
Engineer and Manager.

Greenock Corporation Gas Department,
May 5, 1925.

Low-Temperature Gas and Gas from Low-Grade Coal.

SIR,—I was glad to read the articles on this subject which appeared in some of the daily papers last week. Without doubt valuable work is being done at the Government Research Station. The satisfactory production of good smokeless fuel should open up new markets in those Mediterranean countries where charcoal fires are still in vogue. Wood is mostly dear and scarce, so a suitably-produced smokeless fuel, which is an excellent substitute for charcoal, should find a ready and profitable market. For the home market to compete with coal for domestic purposes, smokeless fuel will need to be available at competitive prices. The most economic place to produce fuel is, as a rule, where there is a profitable market not only for the fuel itself, but for the rich gas obtained from the low-temperature process of carbonization. In most cases this will be found to be the existing gas-works throughout the country; and if the Fuel Research Board, as a result of their excellent work, can show that the installation of the necessary plant is a sound proposition for gas undertakings, they will have rendered a great national service.

In conjunction with this proposition, consideration should also be given to the question of installing suitable plant at the pit-head, for the complete gasification of such low-grade coal as will not economically bear the heavy cost of transport. The gas so produced could with ease be sent out by high-pressure pipelines to the different gas undertakings, where, mixed with low-temperature gas, or alone, it would meet all the requirements of a public gas supply.

Being sent out at high pressure, the mains involved would not be large, and in numerous cases they could be laid along the canals to the towns *en route*, and so save even the opening-up of roads. In America a similar arrangement of pit-head plant is being installed, and the gas produced is to be sent under pressure as far as 50 miles, for breaking down or supplementing natural gas supplies, which are becoming exhausted.

C. B. TULLY.

Engineers' Club,
London, W. 1,
May 6, 1925.

Special Orders and the One-Half Proportion.

SIR,—In your editorial notes regarding the Aldershot Special Order you appear to have overlooked the fact that the extension of borrowing powers to one-half the amount of the share capital is a common clause in Special Orders. The novelty of the Aldershot application lies in the fact that it is the first application for such temporary powers under the Public Utility Companies (Capital Issues) Act to be made permanent.

A. S. CAMPBELL.

Wellingborough Gas Light Company, Ltd.,
May 7, 1925.

[A note on this subject will be found on p. 446.—ED. "G.J."]

Hiring Charges and Installation Delays.

SIR,—I have read Mr. Quigley's tirade about "gas companies of the Metropolis;" and as a hirer from one of the largest for the past thirty years, please allow me to enter my protest, and to say that, if consumers only take the trouble to send their complaints to the proper quarter (the head office), they will find every attention will be given to them, with the utmost civility.

At present I am a prepayment consumer; and here is a recent experience. I did not consider that I was getting as good a result as I should from the gas, so I wrote to the Company. The next morning I received a letter asking me to arrange my own time with an inspector, which I did. The interview took place, and within a fortnight the workmen were busy re-carcassing the house, with the result that I had four extra burners put in, and highly satisfactory lighting. A gas fire was installed, and the two cooking stoves were replaced by a larger one and a gas ring—much to the joy of the female section of my household.

And here is where an adequate response to legitimate complaint benefits alike consumer and Company. My brother came to see me, and at once wanted to know all about the beautiful light. I told him; with the result that he, being an ordinary consumer, purchased a gas fire for each of his rooms. My son did the same. All this means increased comfort and cleanliness and labour saved in three homes, and a greater consumption of gas for the Company.

The fact seems to me to be that your correspondent wrote to you instead of to his Gas Company. During my experience of Metropolitan Gas Companies, I have never once had to complain of the delays Mr. Quigley says he finds exist in his area; but, of course, one must be reasonable. Gas companies, like other industrial concerns, have their difficulties; but they are not slow to appreciate them, which is to the advantage of themselves and their industry, and for the comfort and convenience of their consumers.

CONSUMER.

Brockley, S.E., May 5, 1925.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Bills read a second time, and committed: Barrow-in-Furness Corporation, Bolton Corporation, Gas Light and Coke Company.

Bill reported, with amendments: Uckfield Gas and Electricity.

The further Standing Orders applicable to the following Bills have been complied with: Barrow-in-Furness Corporation, Bolton Corporation, Gas Light and Coke Company.

Gas Regulation Act.

On the motion of Viscount Peel, the draft Special Orders relating to the Brighouse Corporation, Pinner Gas Company, and the Yeadon and Guiseley Gaslight and Coke Company have been approved.

HOUSE OF COMMONS.

Progress of Bills.

The Statutory Gas Companies (Electricity Supply Powers) Bill has been reported from Standing Committee C, without amendment.

Bill read a second time, and committed: Hoylake and West Kirby Urban District Council.

Gas Regulation Act.

The draft Special Orders relating to the East Grinstead Gas and Water Company, Monmouth Gas and Water Works Company, and the Slough Gas and Coke Company were approved on the motion of Sir Burton Chadwick; and the Brighouse Corporation, Pinner Gas Company, and the Yeadon and Guiseley Gaslight and Coke Company Special Orders were also agreed to, on the motion of Colonel Moore-Brabazon.

Smokeless Fuel.

Sir HENRY SLESSER asked the Prime Minister, in view of the reports on the quality of the smokeless fuel produced by the low-temperature carbonization process, and consequent elimination of the smoke nuisance if it were universally employed for household fuel, if the Government would give facilities for bringing an Act into force providing for the compulsory carbonization of bituminous coal before use.

Mr. BALDWIN, in reply, said that as soon as the Government are satisfied that these processes can be operated successfully on a commercial scale, they will consider the steps to be taken to achieve the object which all desire.

SOUTH METROPOLITAN GAS BILL.

HOUSE OF COMMONS COMMITTEE—Tuesday, May 5.

(*Before Colonel* WHEELER (*Chairman*), *Mr.* CECIL WILSON, *Mr.* HANBURY, *and Colonel* HENEAGE.)

The object of the Bill is to allow agreements to be made between the South Metropolitan Gas Company and other gas undertakers for mutual assistance. The only petitioners were the London County Council, who did not object to the proposals in the Bill, but asked that provisions should be made for the revision of the Company's basic price, which was granted by Parliament in 1920, there having been inserted in the Company's Act of 1920 a clause binding the Company to give an opportunity for revision within five years.

The promoters of the present Bill were represented by Mr. H. P. M'MILLAN, K.C., Sir LYNDEN MACASSEY, K.C., Mr. W. E.

Tyldesley Jones, K.C., Mr. Rowand Harker, and Mr. F. J. Wrottesley. The London County Council were represented by Mr. Jacques Abady.

Mr. H. P. M'Millan, K.C., in his opening statement, traced the history of the Company, in order to show how progressive had been the policy pursued. At the present time they supplied a population of between 1½ and 2 million people. The area of supply covered 52 square miles. There were 1340 miles of mains, and 400,000 meters. Gas was supplied within the territory of ten metropolitan boroughs, and three urban district councils outside London, and the Company employed 8000 workpeople. The capital amounted to 6½ millions of ordinary stock, and there was about 2½ millions of loan capital. There were 18,000 shareholders, and between £400,000 and £500,000 of the Company's stock was held by the workmen. Counsel then went on to discuss the resources of the Company (which, together with the proposals of the Bill, were set out in the "Journal" for Dec. 24, 1924, p. 842), and said that it was proposed that those resources should be used to the mutual advantage of this Company and the gas companies which abutted on to its area of supply. These were the South Suburban, the Croydon, the Wandsworth, Wimbledon and Epsom District, the Gas Light and Coke, and the Commercial Gas Companies. The powers sought were carefully hedged with limitations. In addition to the limitation that agreements for mutual assistance could only be entered into with statutory companies supplying in areas adjacent to the South Metropolitan Company's area, it was provided that the agreements must be subject to the approval of the Board of Trade. The particulars of any agreements entered into must be submitted to the London County Council, who were entitled to make representations to the Board of Trade, while local authorities affected, who were outside the County area, could also make representations. There was a clause to protect the Port of London Authority in connection with agreements which affected river accommodation. At present the South Metropolitan Company had power to amalgamate with any of the adjacent companies mentioned. The present proposals were considerably short of amalgamation, however, because that was not regarded as practicable or feasible at the present moment. There were several difficulties. The different companies had varying schemes of co-partnership, benefit funds, superannuation funds, and so on, the amalgamation of which would present considerable difficulty. Again, the prices of gas varied, and amalgamation might involve the continuance of differential prices, and consequent discontent, while the districts themselves to some extent varied in character. Very similar arrangements to those proposed in the Bill had received the sanction of Parliament in the case of electricity companies. The present proposals had undergone the scrutiny of the local authorities and others interested, and apparently had elicited only approval.

Coming to the opposition of the London County Council, he said that up to 1920 the legislation governing the Company might be said to have proceeded generally on the lines of that of the other London gas companies. In 1920, however, Parliament had sanctioned a new departure in the matter of charging for gas. The South Metropolitan Gas Company's Act of 1920 had established the heat unit basis for charging for gas supplied, and had established a new method of regulating the price of gas, and for applying the profits of the Company. The Bill had encountered considerable opposition when it was promoted in 1920. It had been opposed by the City of London Corporation, the London County Council, and by eight Metropolitan boroughs, and was also confronted with an adverse report by the Board of Trade. The general ground of that opposition was that the Company should await general legislation, which was then contemplated, and should not proceed with a Bill on their own lines. The House of Lords Committee before whom the Bill came had decided that, notwithstanding this opposition, the Bill should be considered, and, after hearing evidence, had allowed the Bill to proceed. But there had been inserted in that Bill, by agreement with the Company, a clause providing that the Company should, not later than the 1925 session, promote a Bill in Parliament proposing a revision of the provisions of the Act as to basic price, or giving an opportunity for such revision to be made. It was provided that the London County Council and the council of any metropolitan borough or urban district within or partly within the limits of supply of the Company should be entitled to be heard on such Bill. Thus, said Counsel, the present Bill gave the opportunity for a revision of the basic-price system. At present neither the City Corporation nor the eight metropolitan boroughs had any criticism to make, and there was no report from the Board of Trade. The Company's Act of 1920 enabled them to charge for gas on the heat value basis, and to introduce a system of charging which involved a basic price, and a system of participation in profits by consumers, shareholders, and worker co-partners in certain prescribed proportions. The basic price fixed by that Act was 11d. per therm, and the basic dividend was 5 p.ct.

The London County Council had taken advantage of the fact that the Company were in Parliament (as they were bound to be) in order to criticize the scheme; and this was quite legitimate. The Council submitted that the time had now come when uniform procedure should regulate the revision of the powers of charging of all gas companies supplying in the county; and they objected to the present Bill being passed unless provisions were inserted enabling the Board of Trade, at any time, on the application of the Company or the petitioners, to make an Order revising the powers of charging authorized by the Company's Act of 1920; or, alternatively, unless provisions were inserted reducing the basic price of gas fixed by the said Act and providing for the future regulation of such powers. Thus, said Counsel, the petition of the London County Council was simply that the Company ought now to be brought under the general legislation, and that the special provisions which had been sanctioned by Parliament in 1920, in recognition of the Company's merits, and the merits of their system, should be abrogated. The present proposal was that the basic price of 11d. per therm should be revised. Counsel submitted that the experience of the past five years had shown that Parliament were exceedingly wise in granting the basic price of 11d., which had been operated with great fairness and moderation by the Company. The working of the scheme had shown that the margin between the selling price and basic price had never been excessive. The elasticity of the system had been proved to be not greater than ought to be accorded to a well-conducted company; and he suggested that the margin ought to be considerably greater now than it was before the war. If the Company had been subject to the general legislation, instead of to the provisions of their own Act, they would have been entitled to a standard price in excess of 11d. The Gas Regulation Act was rather a dividend-protecting measure than anything else, and could not compare with the South Metropolitan Company's scheme, which had worked so admirably, and was not criticized by the consumers. Yet it was suggested that, for the sake of uniformity, the Company should be subjected to the provisions of the Gas Regulation Act. His submission was that experience had justified both the basic price of 11d. and the operation of the scheme to which that basic price was related, and that if the Company had been working under the general Act, the results would have been in no way so advantageous to the parties concerned. Also, as a matter of Parliamentary practice, it was an unheard-of thing to subject a Company, against their wish, to a code which, so far as all other companies were concerned, was merely optional. The Company looked upon this matter with some concern from the point of view of their working co-partners. The confidence of the workpeople, and the friendly relations existing, had been one of the greatest assets of the Company, and had been to the advantage of the public. He asked the Committee not to disturb that confidence.

Dr. *Charles Carpenter* (President of the Company, and Chairman of the Board of Directors) then gave evidence, and supported Counsel's statement. The proposals of the Bill were in the public interest; and because they were in the public interest, they were also in the interests of the Company.

His evidence concerning the trend of gas legislation, with regard to the methods of charging for gas, was interrupted by the adjournment of the Committee until Wednesday.

Wednesday, May 6.

Dr. *Carpenter* resumed his evidence, and said that, up to the time of the war, when the old sliding-scale was in existence, the then state of affairs was satisfactory. The most important principle was that the control of gas undertakings must be from within, and not from without; and this was the principle of the old sliding-scale. Due to the war, however, the old sliding-scale principle broke down; but it was inexpedient that there should be any control of prices by an outside authority. The Temporary Charges Act of 1918 was merely a stop-gap, and operated only to a limited extent. At the close of the war, therefore, it was necessary to review the whole position. In doing this there were three main matters—(1) the financial question, (2) the great advance on the technical side of the gas industry consequent on the work of the Fuel Research Board, and particularly that of Sir George Beilby, and (3) the question of still further improving the relationship between the Company and its employees. These matters were correlated, for not only had the old sliding-scale broken down as regards the shareholders, but it had failed as regards the workpeople. The great bulk of labour, he believed, did not object to capital getting a fair return, any more than capital objected to labour receiving a fair wage. While it might be arranged that capital and labour received a fair return, this did not meet the requirements of the consumer, because it might leave capital and labour with no incentive to put forth any greater efforts to improve the position of the consumer. Therefore, the basic-price system was devised. The South Metropolitan Company made the recommendations of Sir George Beilby and the Fuel Research Board, as to charging for gas by its heat value, the basis of its Bill of 1920. At the same time they did not proceed on the basis of the Gas Regulation Act of 1920—viz., to secure from the Board of Trade a therm price based on the increased cost of manufacture since 1914. The Company asked for an increase in the standard dividend from 4 p.ct. to 6 p.ct.; but Parliament decided the increase should be to 5 p.ct. A basic price of 11d. per therm was asked for and obtained. As a result of the experience with the basic-price scheme, he asked Parliament to allow the Company to continue under the scheme of their own Act of 1920, which was passed by Parliament in the face of opposition by a large number of local authorities and also an adverse report by the Board of Trade. That Act, for the first time, as regards co-partnership, enabled Labour to share on equal terms with Capital in the prosperity of the Company. The London County Council, concerning the present Bill, desired that the Company should not be allowed to continue in the exceptional position in which they had been placed by their Act of 1920. The Council first contended that the basic price of 11d. should be lowered, and also that the Company should be subject to revision upon the terms of the Gas Regulation Act of 1920. As regards the first, the margin available with the present basic price was only sufficient to allow the system to work satisfactorily. In the second place, Dr. Carpenter said he objected to revision by an outside authority who were not in a position to know what price should be charged. The margin at present between the basic price and the price charged was 2¼d., which was not more than enough to enable the Company to carry on the undertaking in a manner which would produce the best results. The benefit to the Company and the workpeople could only accrue if the price charged was less than the basic; and if a lower figure than 11d. were fixed, it would mean that neither the shareholders nor the workpeople would get anything worth having out of the basic price scheme. Apart from the suggested revision of the basic price of 11d., Dr. Carpenter said he objected to automatic revision, by which the Company would have to go through a particular performance whether there were good reasons or not. The Company were in Parliament with Bills sufficiently often to give Parliament full control over the Company. In 1920, when Parliament passed the Company's Bill, it was arranged that the Company should come to Parliament in five years, and give an account of their stewardship under the basic-price system. This was what they were now doing. He objected to the operations of his Company being sterilized by automatic machinery.

Mr. Jacques Abady then cross-examined on behalf of the London County Council.

Witness agreed that if the Company were successful in its present application, there would be no provision for revision of the basic price.

COUNSEL then explained that there was no intention on the part of the County Council to suggest that the basic price scheme should be altered. They asked that a clause should be inserted in this Bill giving the Board of Trade power to revise the basic price—not to alter it to the sliding-scale with a standard price—at any time, on application by the Council or the Company, but not so as to deprive the Company—*i.e.*, the shareholders or co-partners—of any benefit to which they might be entitled by reason of economy or good management.

Witness: My first question as a layman is: "Where is the snag?"

COUNSEL: There is no snag.

Witness: Then the answer is that I do not want the Board of Trade brought into this matter, directly or indirectly. I think Parliament are competent.

COUNSEL said the case for the London County Council was that revision of the 11d. basic price was due, and that if the Committee did not revise it in this Bill, and provide for revision in the future, then a clause should be inserted providing for periodical revision.

In the course of further cross-examination, it was put to the witness that a revision of the basic price would not interfere in any way with the new position of the employees as regards co-partnership under the Company's Act of 1920. Dr. Carpenter, however, contended that, inasmuch as any reduction would set back the point from which the benefit to the co-partners would start, the whole basis of the 1920 scheme would be seriously interfered with. The possibility of periodical reduction would be a violation of the principle of the Company's Act of 1920, upon which the workpeople had been treated since that Act was passed.

It was suggested by Mr. Abady that, so far as the incentive to reduce prices was concerned, the sliding-scale worked in the same way as the basic-price system; but Dr. Carpenter maintained that the sliding-scale would never have done for the South Metropolitan Company what the provisions of the 1920 Act had done.

Mr. ABADY wanted to know why the South Metropolitan Company objected to the clause which the London County Council asked should be inserted, when there was nothing in that clause which affected the Company.

Dr. *Carpenter* replied that one of his great objections to control by the Board of Trade was that it was possible, under the Gas Regulation Act, to fix a standard price for gas in London, which would do an enormous amount of mischief in increasing the price of gas to the consumer.

COUNSEL, dealing with the alterations in the Company's position brought about by the 1920 Act, said that the Act enabled the Company to distribute 5 p.ct. instead of 4 p.ct. to the shareholders without decreasing the price of gas, and allowed the 5 p.ct. to be distributed however high the selling price of gas. Also, he said, it enabled the increment to the shareholders over and above 5 p.ct., in respect of each price reduction, to be increased from £8813 to £11,000. It had given the co-partners a statutory right to a share, but it had enabled the shareholders to take 1 p.ct. more profit than previously, before the co-partners received anything.

Witness said that what it had done was to restore to capital what had been already restored to labour. Labour had had its standard wages raised in accordance with the post-war conditions, and so capital had had its standard raised in accordance with the changed conditions.

COUNSEL remarked that the scheme also enabled the point at which benefits were derived to depend not upon the price of gas to the ordinary consumer, but on the average price to all consumers, which was an advantage to the shareholder, because the average price was a lower figure than the price to the ordinary consumer.

Dealing with the clause suggested by the London County Council, and the provisions of the Gas Regulation Act, Mr. Abady said there was nothing in the clause submitted by the Council which would deprive the South Metropolitan Company of the benefit of any reduction in cost due to efficiency. If the reduction were due to efficiency, it was due to a cause within the control of the Company; and it was only in respect of reductions arising from circumstances beyond the control of the Company that the Board of Trade, under this clause or under the Gas Regulation Act, had power to make reductions in price. He maintained that in 1920, when the Company's Bill was before Parliament, the Company's Counsel had offered the revision of the basic price by a competent tribunal, if the London County Council pressed the point that 11d. was too high.

Dealing with the basic price of the South Metropolitan Company and the standard prices of the Gas Light and Coke Company and the Commercial Gas Company, Counsel said that, when the basic price of the South Metropolitan Company was fixed, prices were not at their peak, and they had applied for a 5 p.ct. dividend, which they were sure of, so long as they had the revenue, however much the price of gas increased. The Gas Light and Coke Company and the Commercial Company had applied for a standard price under the Gas Regulation Act at a later date, when prices were very high indeed, and, consequently, their standard prices were much higher. Also, as they were under the provisions of the Temporary Increase of Charges Act, and were deprived of their full dividends for a longer period than the South Metropolitan Company, their standard prices were fixed higher.

Witness said that, if the standard prices were fixed on the basis that the Gas Light and Coke Company and the Commercial Gas Company had had a reduced dividend for a longer period than the South Metropolitan Company, he should say that the Board of Trade had exceeded their powers.

COUNSEL then pointed out that the Gas Light and Coke Company had a co-partnership scheme, and that for every 1 p.ct. dividend paid to the shareholders the workmen received a certain amount.

Witness said that the distribution did not take into account the advances in wages made since 1914.

COUNSEL mentioned that in 1923 the co-partners of the Gas Light and Coke Company had received £63,666, and in 1924 £71,794, though the reduced standard price of 11d. was operating in the latter year. Did this show that the powers of the Board of Trade operated to reduce the workmen's share, as had been suggested?

Witness remarked that, though the amount distributed was increased, there were twice as many men to share the higher figure as there were to share the lower amount.

COUNSEL said that in 19 cases out of 20, when Parliament had fixed a standard price, that price was fixed under economic conditions which were more or less stable; and he obtained an admission from Dr. Carpenter that in 1920 economic conditions were not stable.

Mr. ROWAND HARKER, re-examining Dr. Carpenter, said that the clause in the 1920 Act of the Company relating to revision made no reference to any tribunal other than Parliament. The Company's attitude was that, if there were to be a revision of the basic price, they asked this Committee to consider whether the 11d. was to-day the right and proper basic price, rather than that the suggestion of the County Council, referring the matter to the Board of Trade, should be acceded to.

Dr. *Carpenter* agreed, and said that in 1920 the Company had never contemplated the possibility of periodic revision.

The Committee adjourned until Thursday.

THE COMMITTEE'S DECISION.

The Committee continued consideration of the Bill on Thursday and Friday. On the conclusion of the Company's case, Mr. Abady addressed the Committee on behalf of the London County Council, after which,

The CHAIRMAN said the Committee had come to the decision that the basic rate of 11d. was justified at the present time. This was their view from what they had heard during the proceedings. The Committee did not propose to insert the clause asked for by the London County Council bringing the Company under the revision of price clauses of the Gas Regulation Act; but a clause similar to clause 27 of the Company's Act of 1920 would be inserted, by which the Company would be compelled to come to Parliament in 1935 in order that there should be an opportunity of revision then. It was to be made clear, however, that this did not mean that there must necessarily be a revision, but that there would be an opportunity for revision if the circumstances warranted.

Mr. ABADY intimated that the London County Council might decide not to take any part in drafting the new clause, with a view to opposing in the next House.

The Committee then adjourned until Wednesday, May 13, when the promoters promised to bring-up a clause to give effect to the Committee's decision.

NEWPORT CORPORATION BILL.

When this Bill came before the Local Legislation Committee of the House of Commons, presided over by Colonel Sir JOSEPH NALL, last week, there was opposition by the Newport Gas Company, with respect to a clause giving the Corporation power to develop and lease lands; the Company's object being to prevent the Corporation leasing buildings on those lands, and binding the tenants not to use gas.

Mr. F. N. KEEN, representing the Corporation, said that all the Corporation were asking was that they might have power to lay-out and develop certain lands that they acquired, and to lease those lands, or part with them in other ways. They were not seeking to diminish the rights given to the Gas Company by Parliament to supply gas to all who wished to take a supply. It was suggested by the Gas Company that the Committee should add a proviso to the clause in question, to the effect that the Corporation should not make or impose, under the powers of this section, any term, condition, or restriction with respect to the form of light, heat, power, or energy to be used in any building or on any lands, or with respect to the taking from any particular local authority, company, body, or person of any form of light, heat, power, or energy.

COUNSEL, in reply to Mr. Neville (a member of the Committee), said that the electricity undertaking in Newport was carried on by the Corporation, and the Gas Company were apprehensive that, in developing buildings upon the lands which the Corporation acquired, and leasing them to tenants, they might impose some restriction confining the tenants to the use of electricity instead of gas.

Mr. *O. T. Morgan* (Town Clerk), in evidence, said that the Corporation had no intention of treating the Gas Company unjustly, and the latter could not complain that in the past the Corporation had treated them unjustly.

Witness, cross-examined by Mr. Rowand Harker (who represented the Gas Company), agreed that in the case of certain housing estates the Corporation had insisted upon the tenants of those properties entering into an agreement in which there was a clause providing that the tenants were not to use gas for the purpose of lighting.

Witness, in re-examination, referred to one of the estates, which was acquired under the Housing Acts for the erection of working-class dwellings. In August, 1920, in connection with the supply to this estate, the Gas Company had written asking that for each house supplied with a complete installation of gas lighting (five points), cooker, and wash boiler, the housing authority should contribute £12 10s. towards the installation costs, the gas appliances remaining the property of the Gas Company. In the event of the Corporation being prepared to give the whole of the public lighting of the estate to the Gas Company for a period of not less than twelve years, the housing authority would be asked to contribute £11 10s. per house only, the appliances remaining the property of the Gas Company. The Corporation had had an offer from the Electricity Department to lay all services and the lines on the estate, but the electricity undertaking required a guaranteed payment of £1000 a year until the revenue from the supply of current amounted to that sum. The facts had been laid before the Housing Committee, and, on the advice of the Housing Commissioner, the Committee had accepted the offer of the Electricity Department. One of the terms of the offer was that electricity only should be used for lighting the houses.

Witness, in reply to the Chairman, said that the clause did not prevent gas stoves being installed. The Corporation, he said, had not

imposed the condition referred to without consulting the Housing Commissioner.

The Chairman said it was surely outside the scope of the Housing Commissioner as to whether any ordinary citizen should be prevented, by the imposition of some unreasonable clause in an agreement, from using such kind of light or heat as he might wish to use.

Witness pointed out that the condition was part of the terms offered to the Corporation, and, in reply to Counsel, said the apprehension of the Housing Committee was that, if they accepted the offer of the Gas Company, it would make the housing estate more burdensome than if electricity were installed by the Corporation.

In regard to another housing estate it was put to witness that the Corporation had never even approached the Gas Company; and the reason he gave was that it was assumed the same terms would be applicable.

Major Colfox (a member of the Committee) ascertained that there were both electricity and gas mains very near to the sites with which the present Bill was concerned, so that there was no question of having to incur the cost of laying new mains, and there would be no capital cost to be borne by the gas or electricity undertaking. Therefore, there would not be any very great disparity of price between electricity and gas, and there would be no objection, from the tenant's point of view, to having the proviso suggested by the Gas Company inserted in the Bill.

Witness said he did not suppose for a moment that the Corporation would think of imposing such a restriction in these cases; but, at the same time, they did not want a precedent created by the insertion of this proviso.

Major Colfox, dealing with the prohibition of gas for lighting in the housing estates previously referred to, said that the Corporation, in the person of the electricity undertaking, wished to make the Corporation, in the person of the Housing Committee, give them a monopoly.

Witness disagreed, and said that those were the terms upon which the electricity undertaking were prepared to supply; and the Housing Committee had not accepted those terms until they had consulted the Ministry of Health through the Housing Commissioner.

Mr. *A. N. Moore* (Electrical Engineer) said the Electricity Committee's request that the Gas Company should not be allowed to supply gas for lighting purposes was for the reason that, unless the Electricity Committee could be assured of a reasonable return on their capital expenditure for lighting purposes, they would not be able to justify their expenditure as part of their general balance-sheet.

Cross-examined by Mr. Harker, witness said he was not aware that the question of restricting tenants with regard to the use of gas applied to other premises besides the housing estates referred to. Mr. Harker mentioned, however, the case of a refreshment room, which was Corporation property, where the tenant desired to have a gas cooker, and suggested that the Corporation had refused to allow a gas cooker to be installed, but had insisted upon the tenant having an electric cooker. Witness said he knew nothing about this.

After the Committee had conferred, the Chairman said they did not think they need pursue the Gas Company's petition further. Their decision was that the proviso should be added to the clause.

STATUTORY COMPANIES (ELECTRICITY SUPPLY POWERS) BILL.

This Private Member's Bill, promoted by Mr. Clarry in the House of Commons, was disposed of in less than five minutes by a Standing Committee of the House on Tuesday, May 5.

There were no amendments, and the Bill was reported to the House accordingly. The Bill, as we have already pointed out, removes the present disability on gas companies, and enables them to apply direct to the Electricity Commissioners for Electric Lighting Provisional Orders, and to apply their capital for the purposes of working such electricity powers.

The next stage is third reading.

UCKFIELD GAS AND ELECTRICITY BILL.

The Unopposed Committee of the House of Lords have ordered this Bill to be reported for third reading. Its purpose is to incorporate and confer powers upon the Uckfield Gas and Electricity Company; and its main provisions were set out in the "Journal" for Jan. 28, p. 210.

A number of amendments have been made. In the first place, the incorporation of the Company is to take place as from Jan. 1, 1926, instead of Oct. 1, 1925. Also, meetings are to be held yearly in March, instead of June.

With regard to Directors, the number is to be six, but it can be varied so that there are not more than seven or less than five. The qualification of a Director is to be the possession, in his own right or in the joint right of himself and another, of stock to the nominal amount of not less than £100; but a proviso has been added to the clause dealing with this matter, to the effect that the qualification of at least three of the Directors shall be in gas capital of the Company.

If mains for the distribution of electricity have not been laid by the Company in any rural parish in the limits of supply within three years, the Minister of Transport is to be empowered to revoke the powers of supply, if he thinks fit. In the case of gas supply, if mains are not laid within five years in any of the rural parishes or parts of parishes within the area of supply, any local authority, company, or person may apply for an Act of Parliament or Special Order for the purpose of providing the supply, and for the repeal of the Company's powers.

In the Bill as deposited, provision was made for the partial repeal of the powers of the Crowborough District Gas Company for the supply of gas and electricity, and of the Lewes Gas Company in respect of the supply of gas, in certain areas; but the provision for the repeal of powers of the latter Company has now been struck out. The area of supply of gas and electricity by the Uckfield Company has also been modified.

A clause has been inserted giving power to supply, but not manufacture, electrical fittings and appliances.

LEGAL INTELLIGENCE.

GAS MANAGER'S ACTION.

On Friday last Mr. George Helps, General Manager of the Nuneaton Gas Company, applied to Mr. Justice Lawrence, in the Chancery Division, for an Order directing the Oldham Corporation to give further and better particulars of their defence in an action which Mr. Helps is bringing against the Corporation—an action which relates to alleged secret processes in the manufacture and supply of gas. Mr. Trevor Watson, for the plaintiff, observed that his client's secret depended on the supply of gas of low calorific value. Defendants, however, stated that, having disclosed his system in specifications, Mr. Helps had no secret. The Corporation, independently of Mr. Helps, had been using gas of a diminishing calorific value for years. His Lordship held that the Corporation ought to state the calorific value of the gas supplied at the Higginshaw Works, and the occasions on which they had distributed gas of a lower calorific value than the plaintiff since the erection of the works. His Lordship also directed defendants to give particulars of certain interviews with Mr. Helps on which they relied.

GAS PLANT DISPUTE.

On May 6, in the Divisional Court, composed of the Lord Chief Justice and Justices Avory and Shearman, the case of *Newtownards Urban District Council* v. Messrs. *Perry & Co., Ltd.*, came up for argument.

Sir Malcolm Macnaghten, K.C., for Messrs. Perry & Co., said the matter came before the Court on a special case stated by an Umpire under section 19 of the Arbitration Act, 1889, for the opinion of the Court on a question of law in an arbitration between the Newtownards Urban District Council and Messrs. Perry & Co. Counsel said he would have to ask that the case might be remitted, on the ground that the Umpire had said things he ought not to have said, after hearing one side only, and had omitted to state facts which were essential for arriving at the conclusion of law which the Court was asked to advise on. There was a contract between the Council and the firm for the installation, by the latter, of a water gas plant. The Council made a claim against the contractors that the plant was not up to the contract. The matter was referred to arbitration; each party appointing an arbitrator, and the Umpire being appointed by the Court. Counsel then referred to the lengthy proceedings that took place in the arbitration, and said the case, in its present form, could not possibly stand.

Eventually it was agreed by consent that the case should be remitted to the Umpire with certain directions, to proceed with the case and make an award in the form of a special case.

GAS AND WATER DISPUTE AT LIVERPOOL.

An action brought by the Huyton and Roby Gas Company against the Liverpool Corporation to determine the responsibility for damage to a gas main and supply pipes, was resumed before Mr. Justice Finlay, at the Liverpool Assizes, on April 30. The Gas Company claimed that when the new Corporation water main was laid at Roby in 1923, the gas main and supply pipes lost their support and were pressed down by a heavy roller, causing an explosion and serious fractures to develop, together with considerable escape of gas. The Liverpool Corporation denied that they had caused the damage, and said they were not guilty of negligence. They further contended that the fractures were due to the old and defective condition of the gas pipes. A mass of expert evidence as to the formation of the two lines, the manner in which excavations had been made, and the reasons for the gas escaping, was tendered; and after legal argument, his Lordship deferred judgment.

IMPORTANT RATING TEST CASE.

COURT OF APPEAL.

(*Before Lords Justices* Bankes *and* Atkin, *and Mr. Justice* Lawrence.)

Metropolitan Water Board v. Assessment Committee of the Kingston Union and Another.

An important point in connection with rating assessments was raised in this appeal by the Assessment Committee of the Kingston Union from a judgment of a Divisional Court consisting of the Lord Chief Justice, Mr. Justice Avory, and Mr. Justice Acton. The Metropolitan Water Board have underground works in the parish of Teddington, and surface reservoirs in the parishes of Hampton Wick and Hampton. All these parishes are included in the Kingston Union area; and in arriving at assessments upon the undertakings mentioned for rating purposes, the Assessment Committee ascertained the capital value in each parish, and then applied a remunerative rate of interest.

The Water Board appealed to the Middlesex Quarter Sessions, contending that by this method they were over-assessed in regard to both the gross estimated rental and the rateable value, and that the method to apply should have been to assess the undertaking in each parish upon the usual principle of finding the rateable value of the whole from the receipts and expenditure, and then distributing it over the different parishes. The Assessment Committee objected that this method did not comply with the Parochial Assessments Act, 1836. The Middlesex Quarter Sessions upheld the Committee's contention, and stated a case for appeal.

The case stated showed that the gross receipts from the undertakings in 1920 were £3,105,649, and the working expenses £1,593,287, leaving net receipts £1,512,362. The differences between the Assessment Committee's figures and those of the Water Board were as follows:

—	Assessment Committee.	Water Board.
	£	£
Teddington—		
Gross rental	2,484	1,248
Rateable value	2,114	832
Hampton Wick—		
Gross rental	2,061	1,302
Rateable value	803	868
Hampton—		
Gross rental	85,446	52,220
Rateable value	67,862	34,220

The Divisional Court allowed the appeal, holding that the contractor's principle was not the principle to be observed, and that regard should be given to the revenue account and the receipts of the undertaking, and the restrictions placed upon it by statute. The present appeal by the Assessment Committee was from that decision. The case was a test one, and was said to have an important bearing upon similar undertakings throughout the country.

Mr. Mitchell Innes, K.C., Sir Malcolm Macnaghten, K.C., and Mr. Hedley (instructed by Mr. W. Taylor, Clerk to the Kingston Union), appeared for the Assessment Committee; and Mr. Tyldesley Jones, K.C., and the Hon. S. O. Henn Collins (instructed by Mr. C. A. Hunt) for the Water Board.

Delivering reserved judgments, the Court by a majority (Lord Justice Atkin dissenting), dismissed the appeal, thereby affirming the decision of the Divisional Court.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for April 29.]

Nos. 10,184-10,837.

ASKANIA-WERKE AKT.-GES. VORM CENTRALWERKSTATT DESSAU UND C. BAMBERG-FRIEDENAU.—"Gas-fired furnaces." Nos. 10,685, 10,823.

COLEY, H. E.—"Apparatus for manufacture of gas." No. 10,562.

ECKARDT AKT.-GES., J. C.—"Meters for compressed gas." No. 10,390.

RAY, F. M.—"Scrubbing gases." No. 10,199.

SEARS, S. A.—"Apparatus for controlling proportions of gases in mixtures." No. 10,385.

SELAS GAS & ENGINEERING COMPANY, LTD.—See Sears, S. A. No. 10,385.

STANDARD GAS EQUIPMENT CORPORATION.—"Gas heating-apparatus." No. 10,728.

SVENSKA AKTIEBOLAGET GASACCUMULATOR.—"Gas-illuminated signals." No. 10,517.

SYNTHETIC AMMONIA & NITRATES, LTD.—See Ray, F. M. No. 10,199.

TEBBELL, T.—"Manufacture of metallic rings for gas mantles." No. 10,219.

[Extracted from the "Official Journal" for May 6.]

Nos. 10,838-11,473.

ANDREWS, C. W.—"Method of treating gaseous fluids." No. 11,199.

BRASSERT, H. A.—See Andrews, C. W. No. 11,199.

CHEESMAN, T.—"Apparatus for treatment of tar." No. 11,394.

GUNNING, J.—"Apparatus for automatically operating gas valves." No. 11,078.

JASSAWALLA, K. S.—"Combined cooker, geyser, &c." No. 11,250.

JENNINGS, W. F.—"Gas-compressors." No. 11,124.

KEMPTON, C. H. & C. H. A.—"Burners, &c." No. 11,306.

PRESTAGE, E.—See Jennings, W. F. No. 11,124.

Towyn Gas-Works Project.—The Towyn Urban Council at a recent meeting discussed the desirability of purchasing the Towyn Gas-Works. It was resolved that the Aberdovey and Towyn Improvement Committees should consider the project, and report thereon.

Imperial Continental Gas Association Centenary.—A proprietor has given notice of his intention to move, at the ordinary general meeting of the Association to-day: "That a sum of £2000 be placed at the disposal of the Board to be utilized for the permanent endowment of such philanthropic object as they may select, having as its object the extension of assistance to deserving cases occurring among the families of employees of the Association; the said endowment to be an abiding memorial of the proprietors' gratitude to the Directors, past and present, for the valuable services rendered by them to the Association during the period 1824 to 1924."

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following notices have appeared in the "London Gazette" regarding applications to the Board of Trade under the Gas Regulation Act.

Padiham Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 5d. per therm.

It is also proposed that an additional charge per therm of 2·25d. should be authorized in respect of gas supplied through a prepayment meter, with a further additional charge per therm of 0·4d. where the fittings supplied to be used with the prepayment meter include a cooking stove.

AMENDING ORDER.

Wakefield Gas Light Company.

The Board of Trade give notice that the Wakefield Corporation have made application under sub-section 3 of section 1 of the Act for an Amending Order revising the powers of charging authorized by the Wakefield Gas (Charges) Order, 1922, whereby it is desired that a standard price of 11·8d. per therm shall be prescribed.

SPECIAL ORDERS.

Brentwood Gas Company.

The Company are seeking a Special Order to enable them to use scheduled land for gas purposes, to raise additional capital, to establish co-partnership, and to make new provisions with regard to the supply of gas.

Tawe Valley Gas Company.

Application is to be made by the Company to the Board of Trade for an Order under section 10 of the Act to authorize them to raise additional capital, to make provisions as to dividend, to draft further regulations with regard to the supply of gas, and for other purposes.

Worthing Gas Light and Coke Company.

The Company are applying for an Order under section 10 to extend their limits of supply so as to include the parish of Findon, to authorize the Company and the Littlehampton Gas Company to enter into arrangements for the supply of gas in part of the parish of Ferring, and to enable the Company to raise additional capital, to issue capital for profit-sharing, to make regulations governing the supply of gas, &c.

DECLARATIONS OF CALORIFIC POWER.

Ellesmere Port and Whitby Urban District Council.—425 B.Th.U. (July 1.)

Heathfield and Waldron Gas Light and Coke Company, Ltd.—450 B.Th.U., in substitution for 490 B.Th.U. (Aug. 9.)

BELFAST GAS UNDERTAKING.

The policy of making citizens more interested in the greatest of their municipal undertakings is being successfully adopted by Mr. J. D. Smith, M.Inst.C.E., Engineer and Manager of the Belfast Gas-Works, on whose invitation members of the Belfast and District Chamber of Trade visited the undertaking last week.

The visitors, who were met by Mr. H. M'Laurin, J.P. (Vice-Chairman of the Gas Committee), and Messrs. H. M'Keag and G. Stewart, were conducted round the works by Mr. Smith and several members of his staff; and the whole process of manufacture and distribution was explained to them. The plant can produce approximately 14 million c.ft. of gas per day, and the daily output of one retort—about 55,000 c.ft.—is equal to the daily output of the whole works in their early days. The visitors also inspected the water gas plant, the meters, the generating station, the chemical works, and the purifying and cooling plants. After visiting the stove warehouse, the party assembled in the staff dining hall.

Mr. M'LAURIN said that, since Mr. Smith took over the management of the works in 1910, the output of gas had been increased by 70 p.ct., and it was still increasing. During that period £576,000 had been spent on the improvement of the works, and a new holder had been erected at a cost of £156,000. If the Belfast public could see how the gas-works were conducted, they would recognize what a good manager was Mr. Smith. They wanted to make Belfast a smokeless city, and it would go a long way towards this if they could induce householders to use gas instead of coal fires.

Mr. J. M. COLTON, President of the Chamber of Trade, in proposing a vote of thanks to Mr. Smith, said the Chamber were strongly in favour of economy and efficiency; and, so far as they could judge, there were economy and efficiency in the gas-works.

Mr. W. J. PRICE, in seconding the motion, remarked that a great deal of the material represented by the bye-products was formerly imported into Belfast. The output of tar was as great as the amount used in the six counties, and one county took about half the quantity produced. He hoped other counties would use the tar produced at the chemical works they had just visited.

Mr. SMITH, in reply, said he had been gratified by the interest the visitors had displayed. It was just fifty years since the Corporation had taken over the gas-works from the old Company; during that time the undertaking had handed over for the benefit of the ratepayers more than £500,000. They tried to run the works as economically as possible, and it was the wish of the management and the Committee that they should sell gas at the cheapest possible price.

EXAMINATION UNDER THE EDUCATION SCHEME OF THE INSTITUTION OF GAS ENGINEERS.

Forwarding copies of the questions set in the examination in Gas Supply on the 2nd inst., and in that of Gas Engineering last Saturday, Mr. Walter Hole, the Organizing Secretary to the Education Scheme of the Institution of Gas Engineers, points out that in the Higher Grade and the Diploma the paper has been divided into two sittings, each of three hours' duration, instead of, as previously, one paper of four hours. This has been done at the request of students themselves, many of whom last year found it impossible to complete the paper in the time then allotted.

The Examiners were, for Gas Engineering, Messrs. H. D. Madden, M.Inst.C.E. (Cardiff), W. J. Smith, B.Sc. (Bolton), and J. S. Thorman (London); and for Gas Supply, Messrs. S. B. Chandler (Tottenham), George Keillor (Greenock), Stephen Lacey, B.Sc. (London), and A. B. Roxburgh (Newcastle-on-Tyne).

GAS ENGINEERING.

Ordinary Grade (External Examination).

From 2 to 6 p.m.

Sketches can be adopted to obviate long and involved statements.
The general neatness of the paper, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.
Eight questions only to be attempted.

1. Give a front and cross-section of a horizontal setting and furnace, indicating the passage of the gases.

2. Describe, with the addition of sketches, the principles of a typical method of mechanical retort charging and discharging. State the minimum time taken over the complete operation of charging and discharging. Give the weight of charge such mechanical charger would lay suitable for efficient carbonization, giving the length and size of the retort.

3. State what, in your opinion, is the best combustion chamber temperature, giving your reasons. What means are adopted to ascertain combustion temperature?

4. Give a description of the process of water gas manufacture. Describe, with sketches, the apparatus used.

5. Sketch and describe one type of atmospheric condenser. Give the size and area necessary for cooling one million c.ft. of coal gas per day, for an inlet temperature of 130° Fahr., to 70° Fahr., with atmospheric temperature 50° Fahr.

6. Describe a gas exhauster, and state how this is driven and controlled. State the effects of under-exhausting and also over-exhausting on both gas and tars, &c.

7. Describe plant for removal of tar and ammonia from the gas. State the desired temperature which you would expect to find at the inlet of such plant, and give your reasons. Describe what should be the arrangement and condensation to ensure that the whole of the ammoniacal liquor sold or delivered to the sulphate plant is not less than 10 oz. strength.

8. Describe the apparatus and method of testing the calorific value of coal gas. Show the calculations. What special precautions should be taken to ensure accuracy?

9. Describe the chemical and physical principles involved in (1) the regenerator furnace, (2) the setting. Give the chemical equations representing the reactions which take place.

10. Describe, by means of a sketch, the principles of a spiral-guided gasholder.

Higher Grade.

Part I., from 2 to 5 p.m.

(Four questions only to be attempted.)

1. Give the principal sources of gas coal, and indicate in what respects such coals differ. State their behaviour under carbonizing conditions.

2. Give the chemical composition of coal gas and water gas, and sketch and describe the apparatus, giving procedure for the complete analysis of both. Show how the calorific value of coal or water gas is arrived at from the chemical composition, giving an example.

3. State the general investigations and arrangements you would make when taking over the control of a horizontal carbonizing unit to obtain the most efficient results, both as regards therm and residual yields. Give the analyses of producer gas and waste gas which you would endeavour to obtain for maximum efficiency.

4. Describe what you consider are necessary conditions in the carburetted water gas plant to obtain efficient results, stating: (1) The steam and blast pressure; (2) the cycle worked and the reason for its adoption; and (3) the temperature of the carburettor under the varying quantities of oil. State with what regulating instruments you would expect a modern carburetted water gas plant to be equipped.

5. Show the chemical reactions that take place in the removal of sulphuretted hydrogen and the revivification of the purifying material. By what means can the activity of the purifying material be assisted? Describe a method for estimation of sulphur and tarry material in spent oxide.

Part II., from 6 to 9 p.m.

(Four questions only to be attempted.)

6. Describe a method for coke handling with which you are familiar, giving a sketch. What precautions would you take to ensure minimum wear and tear?

7. In construction of foundations, what weight per sq. ft. would you estimate that virgin soil would carry without sinking? (Clearly explain the type of virgin soil referred to.) What foundations would you put in for a load considerably exceeding that which the virgin soil or made-up ground would be capable of carrying without sinking? Explain the principles you would adopt, and give a sketch.

8. Describe, by the aid of sketches, the manufacturing process of sulphate of ammonia on modern lines. State how you would arrive at the efficiency of conversion of the ammoniacal liquor supplied into sulphate.

9. State where, in the process of manufacture, you would recommend the application of mechanical handling of materials in place of hand work; also the power recommended, with your reasons for same.

10. Describe, by the aid of a sketch, the type of grate suitable for burning small low-grade fuel in a works boiler. What precautions would you take to obtain the maximum efficiency? State what steam production you would expect to obtain per lb. of breeze under ¾ in. in size, containing 12 p.c.t. moisture and 12 p.c.t. ash.

Diploma.

Part I., from 2 to 5 p.m.

(Four questions only to be attempted.)

1. Review the effect of the varying percentage of oxygen in coal on the products of carbonization. Compare in this respect any two coals from different coalfields with which you are familiar.

2. Compare the effect of high and low steaming on the throughput and on the products of coal carbonized in a vertical retort system. Give an approximate analysis of the gas under each condition, stating the extent of steaming. Compare the behaviour and throughput of coal per retort in any well-known type of vertical retort installation, reciting two distinct coalfield types.

3. What do you consider the depth of fuel bed necessary in a horizontal retort house producer or generator for the production of good producer gas? Give analysis of such gas, and give and discuss the grate area you would recommend per ton of coal carbonized, sketching the type of grate referred to. Discuss the effect on the quantity and quality of the gas and residuals produced by a change of about 12 p.c.t. variation in the temperature of a combustion chamber of a horizontal installation.

4. State briefly the causes of the existence of naphthalene in crude coal gas, and describe in detail a method for its complete removal from the gas—(*a*) giving the quantity of absorbent necessary, and (*b*) stating how this is disposed of when spent.

5. Discuss the application and merits (technically and commercially) of waste-heat recovery boilers to—(*a*) carburetted water gas plant, (*b*) vertical retort settings, and (*c*) horizontal regenerative settings. Show in each case the controlling influences and methods you would adopt for successful and economical operation, mentioning the quality and temperature of the waste gases you would expect available. State in lbs. the steam developed (from and at 212° Fahr.) per lb. of fuel used in the generator (indicating also the generator fuel consumption). Give your calculation, with the temperatures and CO_2 content of the waste gases at the various points in the setting, regenerator, waste-heat boilers, and the connections leading thereto, which you have assumed in your calculations.

Part II., from 6 to 9 p.m.

(Four questions only to be attempted.)

6. Sketch a cross-section of stills and saturator of a modern sulphate of ammonia plant. Explain the points to which you would give detailed attention to ensure satisfactory and efficient working, and give your reasons. Briefly describe, and give your reasons for, the necessary care and treatment of the waste gases and effluent liquor. What amount of sulphate of ammonia of 21 p.c.t. nitrogen would you expect to obtain theoretically from 10,000 gallons of 10-oz. ammoniacal liquor? Show your calculations for this.

7. Assuming you are in charge of a works containing (say) the following plant, (*a*) one section of horizontal retorts, (*b*) one section of vertical retorts (steamed), and (*c*) one section of carburetted water gas or blue gas plant, discuss briefly the points you would watch, and describe what steps you would take when the three plants were in operation together, to ensure a proper mixture and to maintain the outlet gas at—(1) regular and constant calorific value, (2) regular and constant composition, and (3) regular and constant specific gravity. Explain why this constancy of values is essential.

8. State the prime movers you would employ, and the powers you would adopt, in the mechanical equipment of a medium-sized works, to reduce laborious work to a minimum, commencing with the handling of coal, and dealing with all operations throughout. Give your reasons, and state the efficiencies you would expect from each of the plants you would propose to instal.

9. Give a general résumé of, and illustrate by sketches, the methods adopted for foundational work in gas-works construction, mentioning the nature of the varying sub-soils which may be met, and the types of foundations which can employed on each. State how you would arrange foundations to carry on soft-yielding soils the following: (*a*) Heavy walls of horizontal retort houses, (*b*) concentrated loads as in the case of vertical retort settings.

10. Gas-works are bound to comply with certain Acts of Parliament in their methods of manufacture of gas and residual bye-products. Enumerate the leading points of the Gas Regulation Act, Alkali, and other Acts that operate and have to be observed in gas-works.

GAS SUPPLY.

Ordinary Grade (External Examination).

From 2 to 6 p.m.

Sketches can be adopted to obviate long and involved statements.
The general neatness of the paper, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.
Six questions only to be attempted.

1. If gas reported escaping into telephone street boxes, state what immediate action you would take after arriving at the site, and how proceed to locate the leakage. Assuming the escape traced to a

broken main, describe the work of temporary and permanent repair—the latter with the aid of sketches.

2. A main 6 in. in diameter and 1000 yds. in length has been capped at either end, and the contained air raised to a pressure of 6 in. as measured by a water gauge; thereafter the pressure is observed to fall at the rate of one-tenth in 3 minutes. Calculate the rate of leakage in c.ft. per hour.

3. Make diagrammatic sketches of (*a*) a constant pressure governor, and (*b*) a constant volume governor for controlling gas flows up to (say) 30 c.ft. per hour. Show what forces maintain the governors in equilibrium when in action, and bring-out clearly points of similarity and difference in design. Which do you think is likely to be the more reliable in use, giving reasons?

4. State precisely how you would proceed to test a meter *in situ*, and how you would ascertain that it was of adequate capacity for its work. What are the faults that may develop in meters in use, and to what are they due?

5. Give the composition of a good blow-pipe solder for meter fixing. Also name a suitable flux, and describe its function. What tools is a fitter likely to require when fixing a 20-light meter in a private house?

6. Make sketches showing the construction of the burner, mixing chamber, and nozzle of a modern gas fire. Explain what provision is made for dealing with different pressures and gases, and describe the provisions made to ensure silent burning.

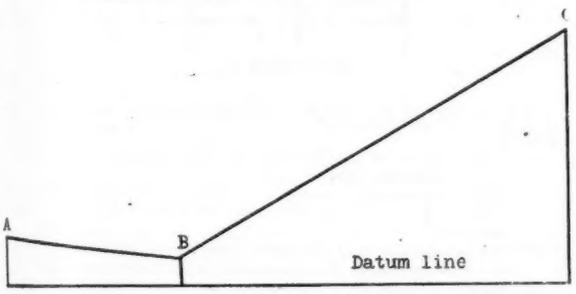
7. Describe, with the aid of sketches, the construction of a sealed type of geyser, and indicate the passage of the products of combustion and water respectively through the apparatus. To what would you pay particular attention when installing a geyser.

8. State how you would determine the thermal efficiency of a boiling burner in a cooker hotplate under working conditions. Give a calculation illustrating your answer. How have the higher efficiencies of modern hotplates been attained?

HIGHER GRADE.

Part I., from 2 to 5 p.m.

(*Five questions only to be attempted.*)



1. The diagram above represents a 12-in. pipe-line. The length of the pipe-line A, B, C = 1000 yards. The altitudes of A, B, and C are 100, 50, and 400 ft. respectively above datum. (*a*) If the specific gravity of gas = 0·6 and the gauge pressure at A = 3 in., what will be the pressure at B and C when no gas is flowing in the pipe? Sp. gr. of water as compared with air may be taken as 780. (*b*) When gauge pressures at A and C respectively are 3 in. and 2 in. and the sp. gr. of gas = 0·6, the rate of flow is found to be 27,000 c.ft. per hour. What will be the rate of flow when, other conditions remaining unchanged, (1) diameter of pipe = 6 in., (2) gauge pressure at C = 3 in., (3) sp. gr. of gas = 0·48?

2. Make a sketch of a mercury-sealed weight-loaded district governor. If the bell floating in the mercury seal is 24 in. in diameter, and the weight of the bell together with the valves and valve spindle suspended from it is 48 lbs., with what additional weight must the bell be loaded in order that the governor in action shall maintain an outlet pressure of 4 in. water gauge? If, with the governor in equilibrium, the outlet pressure falls one-tenth of an inch water gauge without affecting the inlet pressure, what will be the force tending to open the governor at that instant, and upon what factors will the time taken to re-establish equilibrium depend?

3. Discuss and compare the relative advantages of the various means that may be adopted for reinforcing the supply to districts where the pressure in the mains is tending to fall below the permissible limit during peak loads. In your answer have particular regard (*a*) to the necessity of providing for future increase in gas consumption, and (*b*) to the annual charges incurred in respect to capital and running costs.

4. What do you understand by the term "load factor" as applied to gas distribution problems? Show what bearing it has upon the economics of the industry with special reference to the developments of the last 20 years.

5. The following is an analysis of a mixture of coal and carburetted water gas:

	P.Ct. by Volume.
Carbon dioxide	2·6
Oxygen	0·8
Unsaturated hydrocarbons	2·4
Carbon monoxide	12·7
Hydrogen	46·6
Methane	25·0
Nitrogen	9 9

Give a brief account of the properties of each constituent from the standpoints of gas distribution and utilization. Name the constituents invariably found in town gas that are not included in the analysis, and state their significance in regard to corrosion of pipes.

6. To what do you attribute the great increase in the thermal efficiencies of gas engines in the last forty years? What do you consider should be the thermal efficiency and the mean pressure in the cylinder during the power stroke of a modern gas engine of 50 H.P.? Make a careful sketch of an indicator diagram of a power cycle from a modern gas engine, and show how such a diagram would be affected by (*a*) late ignition, and (*b*) early ignition.

Part II., from 6 to 9 p.m.

(*Five questions only to be attempted.*)

7. The mantles of a cluster burner in a street lamp are 15 ft. above the ground, and the following table gives the candle-power at various angles corresponding to the horizontal distance from the vertical axis of the lamp along the ground as shown in the first column.

Distance in Ft. from the Lamp.	C.P
0	200
5	280
10	320
20	310
30	280
40	270

Calculate the horizontal illumination at ground-level due to the single lamp at distances of 5 and 30 ft. from its vertical axis.

8. A hall of 60 ft. by 40 ft. by 15 ft. high is to be heated by hot-water radiators. The average temperature is to be maintained at 60° Fahr. (hall empty) with a temperature of air outside of 30° Fahr. Assuming (*a*) the average loss of heat through walls (including windows, &c.) = 15 B.Th.U. per sq.ft. per hour and loss through ceiling and floor can be neglected, (*b*) heat emitted from the radiator = 135 B.Th.U. per sq. ft., (*c*) air changed three times per hour, and (*d*) specific heat of air = 0·02 B.Th.U. per c.ft., calculate the radiator surface required. In what circumstances would gas heating of the circulating water be justified? Specify the type of gas apparatus you would recommend and the maximum rate of gas consumption (500 gas).

9. What precisely do you understand by "smothering" in a gas oven? To what various causes may it be due? Describe and compare methods adopted in two of the latest types of cooker to eliminate the possibility of smothering, while ensuring the highest practicable efficiency.

10. Discuss the relative merits of gas and coke for the provision of hot water for domestic purposes. Contrast the conditions specially favourable to each.

11. Write a complete specification for a pendant and lighting burner for prepayment supplies.

12. If you were asked to arrange for an examination of the consumers' supplies in a residential district, give a full account of the examination you would make with regard to (*a*) safety of installation, (*b*) adequacy of supply under all conditions, and (*c*) suitability and efficiency of appliances.

TESTING GAS METERS IN BIRMINGHAM.

Annual Report of the Official Inspector of Gas Meters.

In his report to the Birmingham City Justices' Gas-Meter Testing Committee for the year ended March 31 last, Mr. Frederick Colburn states that the number of meters tested totalled 126,770, as against 129,683 last year—being a decrease of 2913. The fees charged amounted to £7161—an increase of £28. The expenditure for the year amounted to £3172, showing a credit balance on fees of £3988, which has been carried to the Borough Fund.

Attached to the report are statistical tables giving an analysis of the results of the testings. Of the meters tested, 3774, or 2·97 p.ct., were rejected, as against 3·58 p.ct. last year. Of 9788 wet meters, 479, or 4·8 p.ct., were rejected; and of 116,982 dry meters tested 3295, or 2·8 p.ct., were incorrect. Of the 3774 meters rejected, 1665 were more than 2 p.ct. fast, 886 were more than 3 p.ct. slow, while 598 were rejected for unsoundness—227 external and 371 internal. Of 632 meters submitted for certification, 406, or 64·2 p.ct., were incorrect; 198 were more than 2 p.ct. fast, 25 were more than 3 p.ct. slow, and 59 passed gas without registering, while 91 were leaking internally or passing small quantities of gas without registering. Of the 45,644 new meters submitted, 25,152 were of the standard sizes, as against 17,244 last year. Repaired meters numbered 80,494, or 63·4 p.ct. of the total. The highest monthly percentage of rejections was 4·1, and the lowest 2·5.

During the year, four 10 c.ft. standard holders have been repaired and re-verified *in situ* by the Standards Department, London; the holders being re-stamped and certified as correct measures. The whole of the standards and auxiliary instruments have now been brought up to date.

Preference Stock Issue at Southend.—An issue, by Messrs. A. & W. Richards, of £50,000 of 5½ p.ct. irredeemable preference stock in the Southend-on-Sea and District Gas Company, is advertised in to-day's issue of the "JOURNAL." The minimum price fixed for tenders is par; and offers must be sent to No. 37, Walbrook, E.C., by Thursday morning, May 21.

Gas at Becontree.—For some time now the "Westminster Gazette" have published articles on modern architecture and building efficiency. In the issue for May 5 was one dealing with the Becontree Estate of the London County Council. On the same page is an advertisement of the Gas Light and Coke Company, in which it is stated that of the 4754 houses at Becontree occupied to date, 4754 are lighted by gas by means of 8739 brackets and 22,425 pendants; 4754 are equipped with gas cookers; 2800 with gas water heaters; and 2270 with gas fires. At Becontree, as elsewhere, gas is proving its value.

CITY AND GUILDS OF LONDON INSTITUTE.

The following questions were set in the City and Guilds of London Institute Examinations in the subjects named.

GAS FITTING.

Chief Examiner: Mr. R. J. Rogers.

Grade II.—*Viva Voce.*

(All questions to be attempted. The maximum number of marks obtainable is affixed to each question.)

1. With how many types of thermostats are you conversant? Are there any conditions under which you would not recommend a thermostat to be fitted to a hot-water apparatus? (*10.*)
2. Supposing that, owing to non-payment of gas account, you have orders to cut-off the supply of gas in a house, but that on calling you are unable to obtain access to the premises, what steps would you take to cut-off the supply, and what would be the procedure before the supply was re-connected? (*10.*)
3. What improvements have been made in modern gas fires to ensure silent burning? (*10.*)
4. Do you, or do you not, recommend a flue pipe to be fitted to the outlet of a gas-cooker oven? State your reasons for or against fitting a flue direct to the outlet of a cooker. (*10.*)
5. How would you test for soundness an installation of gas supply pipes—(*a*) if gas was available; (*b*) if no gas was available? (*10.*)
6. A gas service from main to meter has a defective stopcock inside the building, and you have to replace it with the gas on. How would you proceed to do this? State the precautions necessary. (*10.*)

Grade II.—*Written.*

(The maximum number of marks obtainable is affixed to each question.)

1. Give a sketch of a 6-in. water pressure gauge, and show a pressure equal to 3⅛ in. of water column registered upon it.
How many inches in water column are equal to 1 in. of mercury? (*50.*)
2. Describe the construction of a gas-steam radiator. Name each part, and explain exactly the steps that you would take in fixing the radiator in order to ensure its efficient working. (*50.*)
3. What are the advantages of a geyser fitted with a safety gas valve over a geyser fitted with interlocking gas and water taps?
Describe one type of safety gas valve fitted to a geyser (*50.*)
4. State the consumption of gas per hour of the following:
   (*a*) The boiling burners and grill burner fitted on the hotplate of a modern gas cooker, size of hotplate 24 in. by 20 in.
   (*b*) No. 2 size inverted burner.
   (*c*) A six-tube double-loop gas-steam radiator—(i.) consumption on first lighting, (ii.) reduced consumption when automatic valve is in operation.
   (*d*) An outside lamp fitted with nine No. 2 inverted burners under a superheater.
   (*e*) An eleven radiant gas fire. (*40.*)
5. Name the various types of flue pipes fitted to gas appliances. Explain their composition, and state which type you prefer to use, and the reason for your choice. (*40.*)
6. Heat is given off by a gas fire in several ways; what are these? What percentage of each is obtained from a modern type of gas fire? (*40.*)
7. What are the essential features to be observed in fixing: (*a*) A 5-light dry prepayment meter; (*b*) a gas-heated wash boiler; (*c*) a nine radiant gas fire? (*50.*)
8. What is meant by the terms: (*a*) Diffused lighting; (*b*) concentrated lighting; (*c*) semi-indirect lighting; (*d*) indirect lighting?
Show, by sketches, how these various forms of lighting are obtained, and in what circumstances you would recommend their use. (*60.*)
9. State the general defects likely to occur in a 5-light dry prepayment meter after it has been working for a period and explain how they may be remedied. (*40.*)

Grade II.—*Practical Examination.*

1. Examine the geyser, and state to the Examiner the following:
   (*a*) How the water travels from the inlet to the outlet pipe.
   (*b*) How the products of combustion travel from the burner to the flue outlet.

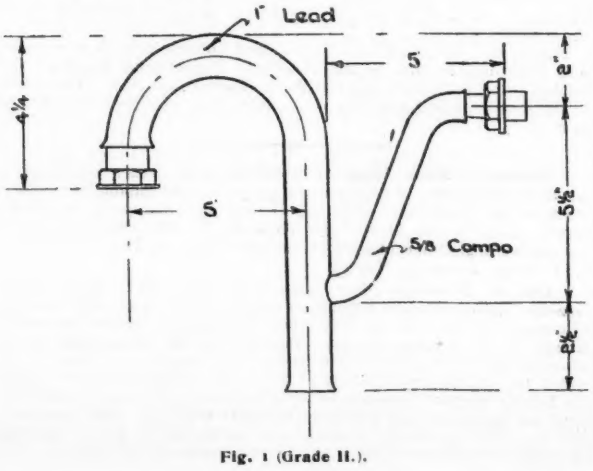


Fig. 1 (Grade II.).

   (*c*) The consumption per hour.
   (*d*) The size of gas and water supplies necessary to give good results. (*½ hour; 20 marks.*)
2. With the material provided make the lead and compo connection shown in fig. 1. The connection to be complete, with the joints as shown and to the dimensions given. (*1½ hours; 30 marks.*)
3. With the material provided make the control tap connection as shown in fig. 2 to the dimensions given. (*1½ hours; 30 marks.*)

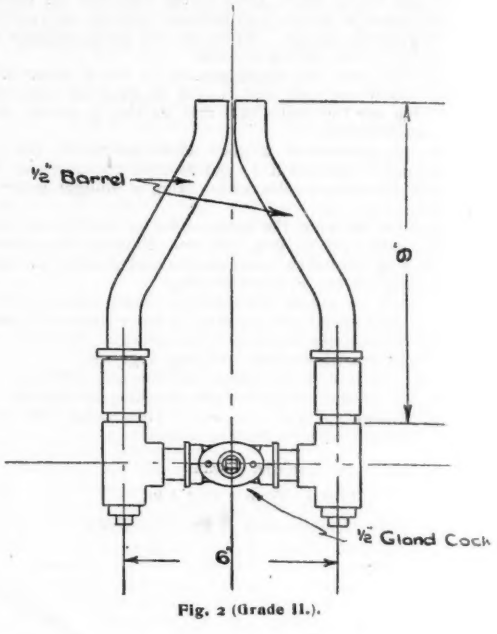


Fig. 2 (Grade II.).

4. Inspect the cooking stove, and explain to the Examiner the following:
   (*a*) Consumption of gas per hour of the hotplate burners, also of the oven burners.
   (*b*) What you consider should be a good oven temperature, and how long it is before this is obtained after lighting up the oven?
   (*c*) The precautions that you would take when fixing the cooker, in order to ensure the maximum efficiency being obtained.
   (*d*) Assuming that the oven burners were constantly going out after the oven door was closed, how you would deal with this defect. (*¼ hour; 25 marks.*)
5. Examine the prepayment dry meter and explain to the Examiner:
   (*a*) Precisely how the gas passes from the inlet to the outlet.
   (*b*) How the coin mechanism operates.
   (*c*) What precautions you would take in fixing the meter.
   (*d*) Points that would influence your decision in choosing a suitable position for this meter. (*¼ hour; 25 marks.*)
6. Inspect the gas fire, and explain to the Examiner:
   (*a*) The function of each part.
   (*b*) The consumption per hour.
   (*c*) The composition of the fuel.
   (*d*) The precautions that you would take in fixing it. (*¼ hour; 20 marks.*)

Final Examination.—*Viva Voce.*

(All questions to be attempted. The maximum number of marks obtainable is affixed to each question.)

1. A consumer complains of a generally bad supply of gas to his residence. How would you proceed to ascertain the cause of the complaint? (*10.*)
2. Describe the difference between an open type of geyser and a sealed type of geyser. (*10.*)
3. What in your opinion is the best way of dealing with the condensation tube of a geyser? (*10.*)
4. By what test would you ascertain whether the products of combustion from a gas fire were entering a room? If you found that they were, how would you overcome the difficulty? (*10.*)
5. In what way does a wet meter differ from a dry meter? What precautions are necessary when fixing both in (*a*) a warm position, (*b*) a damp position, (*c*) an exposed position? (*10.*)
6. Can a consumer compel a gas undertaking to give a supply of gas? If so, when and why is he able to do so? (*10.*)

Final Examination.—*Written Paper.*

(Not more than six questions to be attempted. The maximum number of marks obtainable is affixed to each question.)

1. Describe, and show in plan and elevation, a domestic hot water installation suitable for supplying the apparatus shown in the plans on the examination paper.
Ground Floor.—Range boiler, gas heated circulator, and one sink.
First Floor.—One bath, one lavatory basin, and one towel rail.
State the size of boiler, gas circulator, and the consumption per hour, the capacity of the hot water storage tank or cylinder, and the size of the circulation pipes. (*60.*)

2. Give a description of the construction and use of the following: Any type of thermostat, antifluctuator, gas leakage indicator, low-pressure service governor. (*40.*)

3. State briefly the principle upon which a gas engine works, and give (*a*) the consumption per hour when running on full load, (*b*) the size of service and meter that you would instal for a 50-B.P.H. engine, (*c*) common faults that arise from time to time with a gas engine, and how you would remedy such defects. (*50.*)

4. A consumer is building a house for his own occupation, and you are asked by him to give your reasons why he should use gas in preference to electricity and solid fuel. State fully what your reply would be, indicating the advantages of using gas for (*a*) lighting, (*b*) gas fires, (*c*) wash boiler, (*d*) cooker, (*e*) geyser, (*f*) circulator. (*50.*)

5. A consumer requires a supply of gas to a hardening furnace. It is necessary for the muffle to be supplied with low-pressure gas in conjunction with a supply of air from a compressor. State (*a*) what would be a suitable ratio in the respective volumes of air and gas, (*b*) the pressure in lbs. per sq.in. of air, (*c*) what, in your opinion, is the best means to adopt to prevent the air passing into the gas supply pipe. (*50.*)

6. A shop front, 14 ft. wide, is to be lighted by means of outside lamps; the lighting and extinguishing to be operated from inside the shop. State the number and size of lamps you would use, and the method that you would adopt for the lighting and extinguishing of the lamps, also the essential points that a gasfitter should bear in mind when fixing the lamps.

Assuming that the lamps to be used are of the preheated cluster type, state what, in your opinion, are the advantages, or otherwise, of this type. (*40.*)

7. A garage, 14 ft. long by 10 ft. wide by 9 ft. high, constructed at the side of a dwelling house, is to be heated by means of gas. What form of gas apparatus would you employ for this purpose? Show by means of a sketch where you would fix the apparatus, and state the consumption of gas necessary to maintain a temperature of 50° Fahr. with an outside temperature of 40° Fahr. (*40.*)

8. A consumer requires a geyser to be fitted capable of delivering 2 gallons of bath water per minute. State (*a*) the consumption of gas per hour for which you would allow, (*b*) the size of gas and water supply that you would instal, assuming the meter to be 50 ft. away, (*c*) the precautions that you would take to ensure the most satisfactory and efficient results.

No flue is available in the bathroom. Show by means of a sketch how you would run the flue pipe from the geyser. (*50.*)

9. What is meant by the term "thermal efficiency?"

What is the thermal efficiency obtained by the use of gas in the following: (*a*) Ring burner on cooker hotplate, (*b*) a gas oven, (*c*) a gas-heated geyser, (*d*) a gas fire? (*40.*)

FINAL EXAMINATION.—*Practical Tests.*

(*Candidates must attempt all questions.*)

1. Examine the two gas-heated hot-water appliances, and explain to the Examiner for what purpose each is most suited. Further:
   (*a*) Give the consumption per hour of each.
   (*b*) Explain how each operates.
   (*c*) Assuming each has been in use for some time, state precisely how you would overhaul it so as to ensure the most efficient results.
   (*d*) Explain how the thermostat operates.
   (*½ hour; 20 marks.*)

2. With the material provided make the lead connection as shown in fig. 1 to the dimensions given; joints to be blow in. (*1½ hours; 30 marks.*)

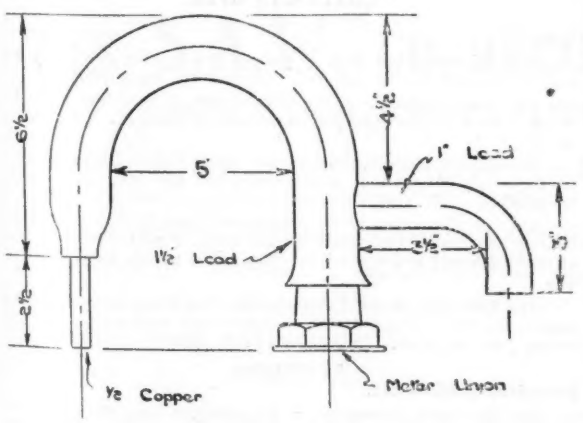


Fig. 1 (Final).

3. Examine the two appliances given you by the Examiner. State what these are, precisely how they act when in operation, and in what circumstances you would recommend them to be installed. Give fully your reasons. (*½ hour; 20 marks.*)

4. With the 1-in. steam quality barrel make the steam radiator connection, complete with flanged joint, to the dimensions given in fig. 2. (*1½ hours; 30 marks.*)

5. Inspect the sketch plan fig. 3 on the plate attached to this paper, which shows an underground meter chamber ready to accommodate a 1000-light cylindrical meter. Explain to the Examiner (*a*) the method that you would adopt to lower the meter to the bed and the precaution that you would take to prevent possible damage, (*b*) step by step how you would fix the meter, (*c*) the size of service

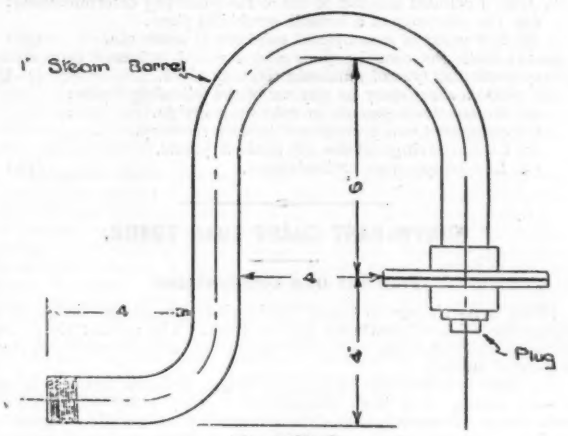


Fig. 2 (Final).

to the inlet, and the size of by-pass that you would fix. (*½ hour; 25 marks.*)

6. With the material provided connect up the tinman's low-pressure soldering-iron stove; also connect up the pressure gauge. Explain to the Examiner (*a*) the consumption per hour of the stove, (*b*) the advantage of this type of stove over solid fuel, (*c*) read off the pressure on the gauge. (*½ hour; 25 marks.*)

COAL-TAR DISTILLATION AND CRUDE INTERMEDIATE PRODUCTS.

Chief Examiner: Mr. W. H. COLEMAN.

FINAL EXAMINATION.—*Written.*

(*Not more than six questions to be attempted. The maximum number obtainable is the same for each question.*)

1. Describe, with sketches, what you consider to be the best arrangement of a modern intermittent tar still, with preheater and other necessary adjuncts.

2. Give some account of the manufacture, properties, and uses of *either* the hydrogenated *or* the chlorinated derivatives of naphthalene.

3. Describe, with sketches, the process and plant used in manufacturing pure benzole from crude naphtha or light oil.

4. Describe the manufacture of 60's carbolic acid. Define the term "60's carbolic acid" and describe the method of testing this acid.

5. Give a specification for creosote oil suitable for preserving timber, and describe the process of using it for this purpose.

6. How is pyridine suitable for denaturing alcohol made? Give an account of the properties and uses of pyridine.

7. Describe fully the manufacture of sulphate of ammonia from gas liquor; state for what purposes it is used; and describe the method of testing it.

8. State to what special hazards the workmen in tar works are exposed, and how they can be lessened.

FINAL EXAMINATION.—*Practical.*

(*All the questions may be attempted if time allows, but full marks can be obtained from* THREE *satisfactory answers. The maximum number of marks obtainable is the same for each question.*)

1. Examine the sample of pyridine marked A, and state your opinion of its quality.

2. Test the sample of motor benzole marked B, and state your opinion of its quality.

3. Determine the percentage of ammonia and of free acid in the sample of sulphate of ammonia marked C.

4. What is sample D? Examine it in the usual way, and state your opinion of its quality.

COKE AND BYE-PRODUCTS MANUFACTURE.

Examiner: Mr. C. P. FINN, B.Sc., F.I.C.

FINAL.

(*Not more than eight questions to be attempted. The maximum number of marks obtainable is affixed to each question.*)

1. Describe, with the aid of neat sketches, a modern type of coal washer to deal with rough slack of size 2 in. downward. (*35.*)

2. Discuss the composition and properties of the various types of refractory materials used in coke-oven construction, and indicate the suitability of each variety for any particular purpose. (*40.*)

3. If you were designing a new coking plant, what methods of quenching and handling coke would you prefer? Describe your scheme (using sketches), and give the reason for your choice. (*40.*)

4. Discuss the physical and chemical properties of coke, and their bearing on the iron industry. (*35.*)

5. Give your views (with suitable sketches) as to an installation to deal with the distillation of 400 tons of tar monthly. (*35.*)

6. Illustrating your answer by means of diagrams, describe any two of the following:
   (*a*) A gas meter for combustion of coke-oven gas under boilers.
   (*b*) A meter for the measurement of crude coke-oven gas.
   (*c*) A pyrometer for the use of foremen and gas regulators.
   (*d*) Some type of gas calorimeter. (*40.*)

7. Enumerate the principal points by attention to which you would secure a practical maximum of economy in the heating of a battery of coke ovens. (*45.*)

8. Give a detailed account of *one* of the following determinations:
(*a*) The efficiency of a benzole scrubbing plant.
(*b*) The value of a sample of sulphate of ammonia. (35.)
9. Set forth the considerations which would influence your choice of any particular type of ammonia recovery plant. (40.)
10. Write a short essay on any *one* of the following topics:
(*a*) Recent developments in coke-oven design.
(*b*) Suggested new processes of benzole recovery.
(*c*) Labour-saving devices on modern plants.
(*d*) Low-temperature carbonization. (45.)

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

There is no change to report in the situation, except the general cumulative effect of continued lack of trade. The market closed for the week under dull and depressing conditions, with a lamentable lack of general inquiry.

Gas coals continue idle and uninteresting, and new business is extremely scarce, with keen competition for any stray orders which come along. Second-class qualities are weaker, and, while the general nominal quotation remains at about 17s., business has been reported in some brands as low as 16s. Wear Specials and best qualities are nominally 19s. 6d., but most brands can be obtained at 19s. f.o.b., and possibly even less for prompt and convenient tonnage.

Other Durham unscreened sorts are in no better plight. The demand for coking is very poor, and best makes are only 17s. to 17s. 3d. Bunker orders are keenly competed for, and best makes are about 17s. 9d. to 18s.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

Gas coals in Yorkshire and Lancashire are quieter in demand for immediate delivery, and forward contracts have been fixed rather earlier this year. Prices generally are 2s. per ton below those of last year.

The recent cold weather has had a steadying effect on the demand for household fuel, and although some producers have reduced their prices slightly, others, in a more favourable position, are maintaining their winter figures.

The industrial outlook appears to have slightly improved, possibly owing to the fact that the irregular working of collieries will cause certain required descriptions of coal to become scarcer than they are at the moment. The commoner grades are still being offered at low figures; but these are not being taken advantage of to any great extent.

The shipping trade continues dull; but there is a hope that a better situation will obtain when producers are compelled to put their products on the market at prices which will compete with those of the nearer Continental coals.

Prices at Hull at the week-end were: South Yorks.—Hards, Association, 20s. to 21s.; screened gas coal, 18s. 9d.; washed trebles, 20s.; washed doubles, 17s. 6d. to 18s. 1½d.; washed singles, 16s. 9d.; washed smalls, 12s. 6d. to 12s. 9d.; unwashed doubles, 16s. 6d.; rough slack, 10s. 9d. to 12s. 6d.; smithy peas, 19s. 3d. to 20s. 6d. West Yorks.—Hartleys, 17s. to 18s.; screened gas coal, 18s.; washed trebles, 18s. 6d.; washed doubles, 16s. 6d. to 17s.; washed singles, 16s. 6d.; washed smalls, 11s.; unwashed trebles, 17s. to 17s. 6d.; unwashed doubles, 13s. to 13s. 6d.; rough slack, 10s. 6d.; coking smalls, 9s. Derbyshire and Notts.—Top hards, 19s. 3d. to 21s.; washed trebles, 17s. 6d.; washed doubles, 17s.; washed singles, 16s. to 16s. 6d.; washed smalls, 12s.; unwashed doubles, 14s. to 15s.; rough slack, 10s. 6d. to 11s. Yorks., Derbyshire, and Notts.—Screened steam coal, 15s. to 17s.; gas coke, 21s. 6d. to 24s.; furnace coke, 16s. 6d. per ton.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

While in its broader aspects the market could hardly be worse, some of the collieries manage to find a fairly steady outlet for their production without curtailing the working week by more than a day or so. This can only be said, however, of those undertakings which, from their geographical position, have the first pull on the markets, and are not greatly susceptible to the competition of districts where supply has outrun absorptive capacity. At the best pits of Cannock Chase and the Warwickshire coalfield a fair amount of regularity is maintained. Elsewhere in the Midlands, collieries which have special economic advantages are making a fair turnover; but more generally the industry is in a sore plight. Prices are very unstable, the unbalanced production of different grades of fuel, owing to the inconstancy of demand, being a very difficult problem. Spot lots are forced on to the market in increasing bulk and numbers. There is no alternative in many cases but to accept the best prices that can be got, so that the position is becoming more demoralized.

Weather conditions have given a slight stimulus to the call for the best grades of house coal. In some cases there is a delay of two or three weeks in getting delivery, but these are quite exceptional and of purely local significance. Steams and other industrial coals are plentiful and cheap. D.S. nuts and beans are in very ample supply. There is again a glut of slacks, and spot lots are offered at lower rates.

Coke is weak, without quotable change. Two North Lincolnshire blast-furnaces are being re-started for the service of the Scottish tube and plate trade; but the new pig iron production will involve displacements elsewhere, as there is no expansion of consumptive requirements.

CURRENT SALES OF GAS PRODUCTS

The London Market for Tar, Tar Products, and Sulphate.

London, *May* 11.

The market for pitch remains unaltered, the price continuing nominal at 41s. to 42s. per ton at makers' works.

Considerable quantities of tar are being delivered for road work.

Creosote is quiet, and the price is unchanged at about 7d. per gallon net and naked at makers' works.

Solvent naphtha, 95/160, is firm at about 1s. 8d. per gallon.

Pure benzole and pure toluole are unaltered at about 1s. 10d. per gallon.

Tar Products in the Provinces.

May 11.

The average values for gas-works products during last week were: Gas-works coal-tar, 27s. 9d. to 32s. 9d. Pitch, East Coast, 40s. to 41s. f.o.b. West Coast—Manchester, 35s. to 36s.; Liverpool, 36s. to 37s.; Clyde, 39s. to 40s.; Benzole, 90 p.c., North, 1s. 7½d. to 1s. 8½d.; crude, 65 p.c., at 120° C., 11d. to 1s. 1d., naked at makers' works; 50-90 p.c., naked, North, 1s. 7½d. to 1s. 8½d. Toluole, naked, North, 1s. 6½d. to 1s. 7½d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8½d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 1s. to 1s. 2d. Creosote, in bulk, North, liquid, 6d. to 6¼d.; salty, 5¾d. to 6¼d.; Scotland, 5¾d. to 6d. Heavy oils, in bulk, North, 6¼d. to 7d. Carbolic acid, 1s. 5d. to 1s. 6d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality 2½d. per minimum 40 p.c., purely nominal; "B" unsaleable.

[We regret that the quotation for salty creosote was given last week as 5¾d. to 6¼d. This should have been 5¾d. to 6¼d.]

Manchester District Tar Prices.

The average prices realized for the sale of tar, according to the sliding scale, for the months of February and March, were £2 12s. 7·46d. and £2 9s. 3·19d. respectively.

TRADE NOTES.

The Anglo-Galvanizing Company, Ltd.

This firm have published a booklet giving details in reference to their process of cold galvanizing (the Bianco process). It is stated that the coating of zinc is perfectly smooth, homogeneous, and compact, and the resistance to corrosion is higher than the coating by the hot method.

Safe Working of Air Compressors.

The notes on this subject compiled in a booklet recently issued by the "Monitor" Patent Safety Devices, of Wallsend-on-Tyne, will prove of value to those in charge of air compressors. Any reader of the "Journal" who is in charge of power plant may have a free copy of this booklet on application to the firm.

Messrs. Clayton, Son, & Co., Ltd.

This firm have received an order from the Windsor Royal Gaslight Company for one of their cascade tar dehydration plants having a capacity of 10 tons per day. A similar plant was recently dispatched to the order of the Municipality of Singapore Gas Department, and another cascade plant has just been put into operation for the Borough of Peebles Gas Department.

CONTRACTS OPEN.

Coal.

The Skipton Urban District Council are inviting tenders for the supply of 10,000 tons of gas coal. [See advert. on p. 486.]

The Gas Committee of the Corporation of Workington are inviting tenders for the supply of 9000 tons of gas coal. [See advert. on p. 487.]

Tenders are invited by the Melton Regis Urban District Council for the supply of 2500 tons of unscreened best gas coal. [See advert. on p. 486.]

The Gas Committee of the Ashbourne Urban District Council are inviting tenders for the supply of 4000 tons, or part thereof, of best screened gas coal and washed gas nuts. [See advert. on p. 487.]

Tar.

The Directors of the Littlehampton Gas Company are inviting tenders for the purchase of their surplus crude coal tar for the year ending June 30, 1926. [See advert. on p. 486.]

EXTENSIONS.

Extensions at Blackburn.

The Blackburn Corporation Gas Committee have received formal sanction from the Ministry of Health to borrow £60,000 for the provision of a gasholder and renewal of oil gas plant. The Corporation will receive a grant in aid from the Unemployment Grants Committee.

Ramsey Gas Company and Electrical Powers.—A lengthy discussion took place at a recent special meeting of the Ramsey (Isle of Man) Town Commissioners with regard to a proposal by them to promote a municipal scheme for the supply of electricity, and to oppose the application of the Ramsey Gas Company to obtain powers to do so. A number of business men in the town presented a petition urging the Commissioners not to proceed with the municipal scheme, on the ground that it was of a speculative character. However, by seven votes to five the Commissioners adopted a resolution that they should oppose the Gas Company's application for powers to instal an electric supply, and should proceed with their own scheme.

Explosion at Belper Gas-Works.—When a purifier was being opened at the Belper Gas-Works, which belong to the Derby Gas Light and Coke Company, an explosion occurred which resulted in slight injury to seven men.

Garforth Collieries, Ltd.—We are informed that the Registered Office of the Garforth Collieries, Ltd., has been transferred to the Offices of the Old Silkstone Collieries, Ltd., Dodworth, near Barnsley. The secretaryship has been taken over by Mr. S. P. Harrison.

Dukinfield Gas Balance-Sheet.—The balance-sheet of the Borough of Dukinfield Gas Department for the year ended March 31 states that the sale of gas amounted to nearly 96 million c.ft., which was an increase on the previous year of 5¼ millions. There was a gross profit on the year's working of £4071, and a net loss of £300. The average price of gas, however, was 3s. 6·52d. per 1000 c.ft., as compared with 4s. 1·33d. for the preceding twelve months.

New Issues Over-Subscribed.—The Tottenham District Light, Heat, and Power Company's recent issue of 5½ p.ct. preference stock was largely over-subscribed. No tender below £102 5s. p.ct. was successful, and the average price of the tenders accepted was £102 6s. 10d. p.ct. The issue of £8000 of 6½ p.ct. irredeemable preference stock of the Wells Gas Light Company was also considerably over-subscribed; the prices ranging from £105 per £100 stock to par.

Hyde Exhibition.—The Hyde Gas Company are to be congratulated upon the organization of a very excellent exhibition, which has just concluded at the Town Hall, Hyde. Opened on May 4 by Mr. G. F. Drinkwater (the Chairman of the Company), the exhibition continued to attract large crowds for the whole of the five days during which it was open. The cookery lectures and demonstrations held each afternoon and evening created considerable interest, and were well attended. The very comprehensive display of gas apparatus on show was supplied by Messrs. W. H. Dean & Son, Ltd., Messrs. Fletcher, Russell, & Co., Ltd., General Gas Appliances, Ltd., the Richmond Gas Stove and Meter Company, Ltd., and Messrs. John Wright & Co.

Manchester Gas Department.—The financial statement of the Manchester Corporation Gas Department for the past year, with the estimates for the current year, were approved at a meeting held on May 1. It was announced that, notwithstanding the extraordinary increase in the sale of gas during the previous year, demand was still well maintained, and a further increase had been realized. The output for the twelve months was 7,218,369 c.ft., against 7,136,192 c.ft. last year. The income for the year amounted to £1,400,647, against an expenditure of £1,253,694. After the deduction of £90,457 on account of interest on loans, there remained a net profit on the year's working of £56,496, which had been applied to the sinking fund for the redemption of loan debt. The estimated profit on the current year's trading was put at £42,961.

Guest, Keen, and Piggotts.—A Company, with a capital of £40,000, has been registered to adopt an agreement between Guest, Keen, & Nettlefolds, Ltd., and Thomas Piggott & Co., Ltd., and to carry on the business of manufacturers of mains, pipes, conduits, &c., and vessels of all kinds for conveying, transmitting, storing, measuring, and otherwise utilizing water, gas, oil, and electricity, manufacturers and drawers of tubes and pipes, &c.

Manchester Meter Testing.—Mr. A. Winterbottom (Official Inspector of Gas Meters for the City of Manchester) has submitted to the Justices of the Peace his annual report for the year ended March 31. The number of meters tested during the year amounted to 60,673, showing an increase of 8146 as compared with the previous year. The fees charged totalled £3345. The number of meters tested is the highest on record. The expenditure amounted to £2711, showing a credit balance of £705. Of the meters tested, 2455 were rejected, or 4·04 p.ct. Of the total wet meters tested—viz., 4886—309, or 6·3 p.ct., were rejected; and of 55,787 dry meters tested, 2146, or 3·8 p.ct., were rejected. The number of prepayment meters tested during the year was 35,014. Standard meters numbered 10,929; the remaining 14,730 being meters of the ordinary type.

Good Gas Sales at Accrington.—Addressing the Accrington District Gas Board, on April 30, the Chairman (Alderman D. C. Dewhurst) said it was too early to forecast the financial results of the year, but gas sales were booming. The production had increased by 27 million c.ft. over last year (an increase of more than 40 p.ct. since 1919). This did not look as though they were "flogging a dead horse" in gas, as someone declared a little time ago. They had fixed 1600 gas cookers, fires, and boilers during the year; and this work was still going on. Gas was being used more than ever in industry and in domestic life. They were working hard to improve the distributing system, and many miles of new pipes had been laid. They had taken from slot meters £45,428, or 101 tons of copper. They had added nearly 400 consumers to their books.

Returns for the Chorley gas undertaking show that during the last municipal year 3,277,000 c.ft. more gas were consumed than in the previous year. In March alone there was an increased consumption of 624,000 c.ft.

Summer courses arranged for students of the Bradford Municipal Technical College include lecture courses and laboratory classes in gas analysis, analysis of coal and coke, and demonstrations in boiler-house practice, with special attention to elimination of the smoke nuisance.

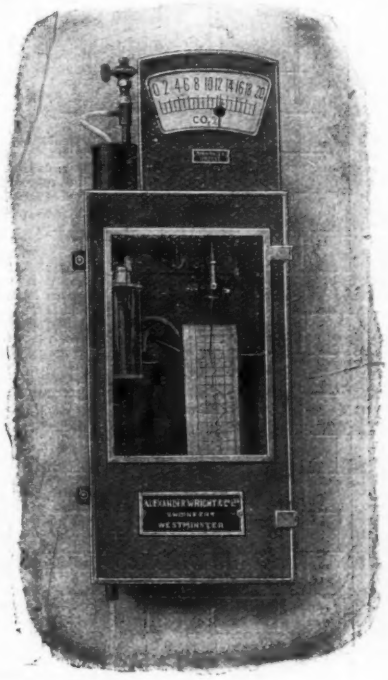
The Buxton Town Council have considered a letter from the Ministry of Agriculture and Fisheries, together with a report from Mr. J. Race, giving the results of his analysis of the various liquids which enter the River Wye from the gas-works. The Gas Engineer was instructed to carry out the suggestions made by Mr. Race to stop the pollution of the river.

CARBON DI-OXIDE RECORDED BY ACTUAL MEASUREMENT.

THE "S.A.W." CO_2 RECORDER

(SIMMANCE, ABADY, & WOOD'S PATENT)

makes a definite volumetric analysis of a gas sample drawn from a continuously moving stream. **ERRORS** due to gravity, osmotic pressure, humidity, &c., are consequently avoided. **ACCURATE** readings are obtained under all conditions of pressure or draught as there is no empirical scale.



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STOCK MARKET REPORT.

ALTHOUGH markets did not respond to the extent expected to the reduction in income-tax, stockbrokers report that business shows a steady improvement. The restoration of the gold standard, involving a general overhaul of investments by large holders, was partly responsible for the activity; but in addition there was a distinct increase in the number of inquiries for all classes of shares.

No material changes occurred in gilt-edged stocks, and Railways continued dull. There were some interesting features, however, in the Industrial market. Courtaulds, after the previous week's fiasco, were actually sold down to 92s. 6d., rising later to 94s. 6d.

It will be seen by the record below that there was an increase in the number of transactions recorded in the Gas Market. Holders of South Metropolitan stock are to be congratulated on the result of the Company's application to Parliament. It is reported that the Select Committee of the House decided last week that the basic rate of 11d. per therm —*i.e.*, the price at which gas can be sold to authorize a minimum dividend of 5 p.ct. to be paid—is justified at present, subject to a revision in ten years' time. This freedom from interference for such a long period will be of great value to the Company. The ordinary stock of the Company now stands at 93-95, there being a fall of 1 point on the week; but the depreciation has not been so heavy as on the stock of the other Metropolitan Companies. Excepting Liverpool 5 p.ct. ordinary, which rose 2 points to 89-90, all the changes during the week on the ordinary stocks were again on the downward side.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. May 8.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			%p.a.	%p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C.	78—81	..	..
295,492	,,	,,	4	4	Do. 4 p.c. Pref.	71—76	..	71—71½
1,551,868	,,	Apl. 2	6½	6½	Alliance & Dublin Ord.	66—71	..	66—67$\frac{9}{16}$
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	63—68	..	..
300,000	5	May 7	8	8	Bombay, Ltd.	4⅞—5⅛*	−⅛	5—5$\frac{1}{16}$
170,000	10	Mar. 5	8½	8½	Bournemouth 5 p.c.	12—13	..	12⅞
425,050	10	,,	7	7	Do. B 7 p.c..	12½—12⅞	..	..
150,000	10	,,	6	6	Do. Pref. 6 p.c..	11—12	..	..
50,000	Stk.	Jan. 8	3	3	Do. 3 p.c. Deb..	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb..	76—79	..	..
992,045	,,	Mar. 5	6$\frac{1}{16}$	6$\frac{1}{16}$	Brentford A Con.	95—105	..	95—95½
990,500	,,	,,	6⅛	6⅛	Do. B New	95—105	..	95
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	95—98	..	96
306,690	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	76—81	..	..
181,337	,,	,,	6	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	104—104½
214,740	,,	Mar. 5	11½	12½	Brighton & Hove Orig.	165—170	..	..
244,200	,,	,,	8½	9½	Do. A Ord.	122—125	..	..
1,287,500	,,	Feb. 19	5	5	Bristol 5 p.c. max.	96½—97¼*a*	..	..
855,000	,,	Mar. 19	8	7	British Ord.	110—115	..	111
100,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	123—128	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—77	..	..
100,000	10	Dec. 18	8	6	Cape Town, Ltd.	7—8	..	..
100,000	10	Apl. 23	4½	4½	Do. 4½ p.c. Pref.	6—7*	..	..
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb.	71—76	..	..
626,860	,,	Feb. 19	6	6	Cardiff Con. Ord.	101—104	..	..
237,860	,,	Jan. 8	7½	7½	Do. 7½ p.c. Red. Deb.	104—107	..	..
157,150	,,	Feb. 19	5	6½	Chester 5 p.c. Ord.	89½—94½*b*	..	..
1,513,280	,,	Mar. 5	6	5/14/8	Commercial 4 p.c. Cap.	86—89	..	86½—87
560,000	,,	,,	6	5⅞	Do. 3½ p.c. Cap.	86—89	..	86½
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	57—60	..	58
800,000	,,	14 Jan. 15	—	—	Continental Union, Ltd.	35—40	..	35½
200,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	88—92	..	88—91
660,000	,,	Mar. 5	6½	6½	Croydon sliding scale	98—102	..	100—100½
284,975	,,	,,	5	5	Do. max. div.	83—86	..	..
492,270	,,	Feb. 19	6	9	Derby Con.	110—112*c*	..	..
55,000	,,	Jan. 8	4	4	Do. Deb.	74—76*c*	..	..
1,002,180	1	Jan. 22	6	4	European, Ltd.	7—8	..	7
16,460,070	Stk	Feb. 19	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	83½—84½	−½	83½—85⅛
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	62—65	..	63½—64⅝
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	78—80	..	79—79½
4,761,930	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb.	59—62	..	60½
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Mar. 19	6½	6½	Hastings & St. L. 5 p.c. Conv.	92—97	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	73—78	..	75
70,000	10	May 7	10	10	Hongkong & China, Ltd.	15½—16½*	−½	17
86,600	Stk.	Mar. 5	10	10	Hornsey 7 p.c.	136—141	−2	137½—138
1,976,000	,,	Nov. 20	30	10	Imperial Continental Cap.	179—184	..	180½—182
263,950	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	71—74	..	73—73½
235,242	,,	Mar. 19	6½	6½	Lea Bridge 5 p.c. Ord.	96—101	..	99½—100
2,127,340	,,	Feb. 19	5½	5½	Liverpool 5 p.c. Ord.	89—90*b*	+2	..
600,000	,,	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	103½—104½*b*	..	104½—105
165,736	,,	Feb. 19	9	8	Maidstone 5 p.c. Cap.	122—132	..	125—125⅝
63,480	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	54—59	..	..
75,000	5	Dec. 4	7	5	Malta & Mediterranean	4⅛—4⅜	..	..
541,920	Stk.	Nov. 20	4	4	Montevideo, Ltd.	62—67	..	65—66
2,061,315	,,	Mar. 5	5	5	Newcastle & Gateshead Con.	77½—78*d*	−1½	77⅛—78
300,929	,,	,,	4	4	Do. 4 p.c. Pref.	72½—73½*d*	..	..
529,705	,,	Dec. 18	3½	3½	Do. 3½ p.c. Deb.	68½—69½*d*	..	..
15,000	,,	Mar. 5	11	12	North Middlesex 10 p.c.	..	..	..
75,940	,,	,,	7$\frac{7}{10}$	8⅝	Do. 7 p.c.	..	..	..
300,000	Stk.	May 7	9	7	Oriental, Ltd.	100—105*	−2	105
188,120	,,	Jan. 8	7⅄	7½	Plym'th & Ston'house 5 p.c.	109—114	..	..
60,000	50	Mar. 5	13	14	Portsea Island B	96—99	..	..
100,000	50	,,	12	13	Do. C	93—98	..	97
2,289,909	1	—	—	—	Primitiva Ord.	9/6—10/6	— /3	9/6—10/6
311,100	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	79—81	..	..
600,000	Stk.	Jan. 22	4	4	Do. 4 p.c. Red. Deb. 1911	63—65	..	63½—64½
220,335	,,	Dec. 18	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
321,670	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Mar. 19	6	6	San Paulo 6 p.c. Pref.	7⅞—8½	..	..
125,000	50	Jan. 2	5	5	Do. 5 p.c. Red. Deb.	43—46	..	43½
270,000	Stk.	Mar. 19	5½	5½	Sheffield A	103—105*e*	..	..
419,968	,,	,,	5½	5½	Do. B	103—105*e*	..	..
1,047,000	,,	,,	5½	5½	Do. C	103—105*e*	..	..
90,000	10	Oct. 23	8	6	South African	7—9	..	..
6,609,895	Stk.	Feb 19	5	6½	South Met. Ord.	93—95	−1	93—94½
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb.	59—62	..	61½
734,000	,,	Mar. 5	6½	6½	Do. 6½ p.c. Red. Deb.	102½—104½	..	103½
91,500	,,	Mar. 5	8½	8½	South Shields Con.	135—136*d*	..	..
1,187,795	,,	Feb. 19	6½	6½	South Suburban Ord. 5 p.c.	97—102	..	97½
368,837	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	97—100	..	..
647,740	,,	May 7	5	5	South'mpt'n Ord. 5 p.c. max.	81—84*	−2	81—84½
121,275	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	72—77	..	..
250,000	,,	Mar. 5	7	7	Swansea 7 p.c. Red. Pref.	101½—103½	..	102½—103
200,000	,,	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	103—105	..	..
120,000	,,	Feb. 19	8	8	Tottenham District A 5 p.c.	116—119	..	117
882,275	,,	,,	6½	6½	Do. B 3½ p.c.	97—100	−1	97—99
181,255	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	77—80	+1½	..
258,251	,,	Mar. 19	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	77—79*d*	..	..
197,294	,,	Feb. 19	6½	6½		100—105	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	95—100	..	..
91,800	,,	,,	—	6½	Do. 5 p.c. Maidenh'd	90—95	..	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Mar. 5	9½	9½	Wandsworth A 5 p.c.	130—135	..	..
255,636	,,	,,	7½	7½	Do. B 3½ p.c.	110—115	..	..
392,955	,,	,,	6/9/6	6/9/6	Do. C and New	95—100	..	..
352,000	,,	,,	7⅝	7½	Wimbledon 5 p.c.	105—110	..	..
98,000	,,	,,	7⅝	7½	Epsom 5 p.c.	115—120	..	..
88,416	,,	Dec. 18	3	3	3 p.c. Deb.	57—60	..	59

Quotations at :—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. * Bx. div.

The following transactions were recorded during the week:

On Monday, Bournemouth 5 p.ct. 12⅞, Brentford "A" 95, Commercial 4 p.ct. 87, Continental Union 35½, 7 p.ct. preference 88, Gas Light and Coke 84½, 84⅜, 84½, 84⅜, 85, 85⅛, 3½ p.ct. maximum 63½, 64, 64⅜, 4 p.ct. preference 79, 3 p.ct. debenture 60½, Hongkong and China 17, Imperial Continental 180⅜, Montevideo 66, Primitiva 10s. 3d., 10s. 6d., South Metropolitan 93½, 93⅜, 94, 94¼. Supplementary prices, Aldershot 5 p.ct. "A" 81½, Dover 5¼ p.ct. debenture 102½.

On Tuesday, Alliance and Dublin 66, Brentford "B" 95, Croydon sliding-scale 100, Gas Light and Coke 83½, 83⅜, 84, 84¼, 84½, 3½ p.ct. maximum 64, 4 p.ct. preference 79, 79½, Hastings and St. Leonards 3½ p.ct. 75, Hornsey 137½, 138, Imperial Continental 181½, 182, 3½ p.ct. debenture 73, 73½, Lea Bridge 99½, 100, Liverpool 7 p.ct. preference 105, Portsea Island "C" 97, Primitiva 9s. 9d., 10s., 4 p.ct. debenture (1911) 63⅜, South Metropolitan 93½, 3 p.ct. debenture 61½, Southampton 84, 84½, Tottenham "B" 98, 98½, 99. Supplementary prices, Brighton and Hove 4 p.ct. debenture 79, Portsea Island 4 p.ct. debenture 73.

On Wednesday, Aldershot 4 p.ct. preference 71, 71½, Alliance and Dublin 66⅞, 67$\frac{3}{16}$, Brentford "A" 95, "B" 95, 6 p.ct. Richmond debenture 104, 104½, 104⅜, Commercial 4 p.ct. 86½, Croydon sliding-scale 100½, Gas Light and Coke 83⅜, 84¼, 84⅜, 84½, 3½ p.ct. maximum 64, 4 p.ct. preference 79, Imperial Continental 182, Liverpool 7 p.ct. preference 104½, Montevideo 65, Primitiva 9s. 6d., 9s. 9d., 10s., 10s. 3d., 4 p.ct. debenture (1911) 64¼, South Metropolitan 93, 93⅜, 94½, South Suburban 5 p.ct. 97¼, Southampton 84½, Tottenham "B" 97. Supplementary prices, Danish 80s., 82s. 6d., 83s. 1½d., 5 p.ct. preference 5½, Malta and Mediterranean 1st 7 p.ct. preference 5⅝, North Middlesex 4 p.ct. debenture 79½.

On Thursday, Bombay 5 *ex* div., Brentford "A" 95, "B" 95, 5 p.ct. preference 96, British 111, Commercial 4 p.ct. 86½, 3½ p.ct. 86½, 3 p.ct. debenture 58, European 7, Gas Light and Coke 83½, 83⅜, 84, 84⅛, 84¼, 84½, 4 p.ct. preference 79½, Imperial Continental 181, Montevideo 65½, Oriental 105 *ex* div., Primitiva 9s. 9d., San Paulo 5 p.ct. debentures 43½, South Metropolitan 93½, 93¾, 94, 94¼, Swansea 7 p.ct. preference 102½, 103. Supplementary prices, Brighton and Hove 7 p.ct. debenture (1930) 106, Danish 80s. 7½d., 5 p.ct. preference 5⅜, Malta and Mediterranean 1st (7 p.ct. preference) 5¼, 2nd (7½ p.ct. preference) 5⅛, Southend-on-Sea 5 p.ct. new "B" 88, 88½, Tottenham 7½ p.ct. mortgages, 1931-5, 105, York Town and Blackwater 7 p.ct. add. ordinary 10¼.

On Friday, Alliance and Dublin 66$\frac{9}{16}$, Bombay 5$\frac{1}{16}$ *ex* div., Brentford "A" 95, 95¼, Continental Union 7 p.ct. preference 91, Gas Light and Coke 83½, 83⅜, 84, 84½, 3½ p.ct. maximum 63⅜, 4 p.ct. preference 79, Maidstone 5 p.ct. 125, 125⅜, Primitiva 9s. 7½d., South Metropolitan 93½, 93⅞, 94, 6½ p.ct. debenture 103½, Tottenham "A" 117, Wandsworth 3 p.ct. debenture 59. Supplementary prices, Malta and Mediterranean 2nd (7½ p.ct. preference) 5⅛, 5¼, Tottenham 5½ p.ct. preference 104½.

There was a shortage of money in Lombard Street last week on account of the payment of the final instalment of about £11,000,000 on the 3½ p.ct. Conversion Loan, and borrowers had to pay as much as 5¼ p.ct. for fresh overnight money, although 4½ to 4⅜ p.ct. was the usual rate. Treasury Bills consequently commanded a higher average rate—£4 10s. 6·29d.

The Foreign Exchange Market was quiet, but generally rates moved against this country. Sterling rate closed at 4.84⅞, French francs at 92.07½, Belgian francs at 96.02½, and Italian lire at 118.10.

Silver was quiet at 31⅜d. per oz., and gold was unchanged at 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on March 5. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3½ p.ct. at notice.